An Actor-Network Analysis of the Healthcare Worker Influenza Immunisation Programme in Wales: 2009-2011

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Abstract

Frontline healthcare workers (HCWs) in the UK have been prioritised for free occupational immunisation against seasonal influenza since 1999. During the 2009-10 influenza pandemic, they were identified as a priority group to receive the strain-specific vaccine. Nevertheless, take-up rates among HCWs have rarely exceeded 50%, even during the pandemic. Most attempts to change this situation have been predicated on the assumption that these low rates are the result of reluctance or resistance by individual HCWs, who must be persuaded or coerced to comply with employer directives.

To gain a novel understanding of this immunisation programme, an actor-network theory approach is adopted to trace the journeys of vaccines through two Local Health Boards in Wales during the 2009-10 H1N1 influenza pandemic and in the following winter influenza season (i.e. during 2010-11).

The research reported shows that low uptake is largely the result of complex social, organizational and cultural processes. Only when these have been changed will it be appropriate to frame the remaining problem as reluctance or resistance by individual HCWs. The study reveals that this immunisation programme is inherently unstable and subject to ambivalence from actors at all levels. Suggestions for practical improvement are given.

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List of Abbreviations

ANT	Actor-Network Theory
APA	Advance-Purchase Agreement
BCG	Bacillus Calmette-Guérin
CCG	Clinical Commissioning Group
CCS	Civil Contingencies Secretariat
CEAPI	Committee on the Ethical Aspects of Pandemic Influenza
CMO	Chief Medical Officer
COPD	Chronic Obstructive Pulmonary Disease
CPD	Continuing Professional Development
DH	Department of Health
EBP	Evidence Based Practitioner
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
ED	Emergency Department
EMA	European Medicines Agency
EMEA	European Agency for the Evaluation of Medicinal Products
ESRC	Economic and Social Research Council
EU	European Union
FDA	Foucauldian Discourse Analysis
GBS	Guillain-Barré Syndrome
GIP	Global Influenza Programme
GMC	General Medical Council
GP	General Practitioner
HAI	Hospital Acquired Infection
HBV	Hepatitis B Virus

HCAI	Healthcare Associated Infection
HCP	Healthcare Professional
HCW	Healthcare Worker
HIV	Human Immunodeficiency Virus
HPA	Health Protection Agency
HPV	Human Papilloma Virus
HSC	Health Security Committee
ICU	Intensive Care Unit
ILI	Influenza-like illness
IPC	Infection Prevention and Control
JCVI	Joint Committee on Vaccination and Immunisation
KI	Key Informant
LA	Local Authority
LHB	Local Health Board
MMR	Measles, Mumps, Rubella
MRC	Medical Research Council
MRSA	Methicillin Resistant Staphlycoccus Aureus
NERVTAG	New and Emerging Respiratory Virus Threats Advisory Group
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
Non-KI	Non Key Informant
NMC	Nursing and Midwifery Council
NPH	New Public Health
NPHS	National Public Health Service
NRR	National Risk Register for Civil Emergencies
OH	Occupational Health

OTC	Over-the-counter
PCT	Primary Care Trust
PFS	Pre-filled syringes
PGD	Patient Group Directive
PH	Public Health
PhD	Doctor of Philosophy
PHE	Public Health England
PICU	Paediatric Intensive Care Unit
POM	Prescription Only Medicines
PPE	Personal Protective Equipment
PSD	Patient Specific Direction
QALY	Quality-adjusted life year
RCM	Royal College of Midwifery
RCN	Royal College of Nursing
R&D	Research and Development
RH	Rachel Hale
RNA	Ribonucleic Acid
RSI	Repetitive Strain Injury
SAG	(Pandemic Influenza) Scientific Advisory Group
SAGE	Scientific Advisory Group for Emergencies
SARS	Severe Acute Respiratory Syndrome
SPI	Scientific Pandemic Influenza advisory committee
STS	Science and Technology Studies
TB	Tuberculosis
UK	United Kingdom
UKNIPC	UK National Influenza Pandemic Committee

UN	United Nations
US	United States (of America)
USA	United States of America
WG	Welsh (Assembly) Government
WHO	World Health Organization

Chapter One

Introduction

Frontline HCWs in the UK have been prioritised for free occupational immunisation against seasonal influenza since 1999. During the 2009-10 influenza pandemic, they were identified as a priority group to receive the strain-specific vaccine. Nevertheless, take-up rates among HCWs have rarely exceeded 50 per cent, even during the pandemic. Most attempts to change this situation have been predicated on the assumption that these low rates are the result of reluctance or resistance by individual HCWs, who must be persuaded or coerced to comply with employer directives. In 2011, for example, the CMO for England, Dame Sally Davies, asserted that 'It is very selfish [for NHS staff] not to be vaccinated [against influenza]' (Guardian 22/09/2011). However, the research reported in this thesis shows that low uptake is largely the result of complex social, organizational and cultural processes. Only when these have been changed will it be appropriate to frame the remaining problem as reluctance or resistance by individual HCWs.

This chapter presents the background to the thesis as a whole. It summarizes the epidemiology of influenza, describes the context of existing policies and research on HCW immunisation and introduces the approach taken in this study.

The Epidemiology of Influenza

Influenza is a common infectious disease. The influenza virus is transmitted by the inhalation of respiratory secretions in the air (either via aerosolized particles or by large droplets), by direct contact (e.g. kissing, hand-shaking), and by indirect contact with fomites (such as touching infected surfaces), making it easy to 'catch' or 'pick up'. The relative importance of each of these transmission methods is debated.

Influenza viruses are unique, as viruses, in their ability to cause annual, seasonal influenza outbreaks, normally during the winter, and, less frequently, epidemics and pandemics. Influenza outbreaks happen every year because influenza viruses mutate constantly, meaning that people cannot acquire long-term immunity to the disease (unlike stable viruses such as smallpox). The high mutation rate is due to the protean nature of influenza as an RNA virus, which means that many mistakes are made during replication. These may cause either a major change in the structure of the virus, known as 'antigenic shift', or a minor change, known as 'antigenic drift' (Wiselka 1994; Cox and Subbarao 1999). When significant changes occur, previously-acquired immunity is by-passed and the conditions created for a major outbreak or indeed a pandemic, depending on the degree of dissimilarity of the new virus to previously circulating forms. The random nature of mutation means that the timing of severe outbreaks is unpredictable. Large influenza epidemics seem to occur at approximately ten year intervals; the extent to which these create PH problems depends partially on the degree of change in the antigenic features of the virus (creating lower background immunity), and the extent to which the timing of the emergence of the new strain has allowed time for the 'current' seasonal vaccine to be well- or poorly-matched. Pandemics only occur due to the

emergence of novel influenza A viruses and have occurred at intervals of between ten and forty years. The first of these was in 1889 followed by 1918, 1957, 1968 and 2009; earlier than 1889 historical and sero-epidemiological data are inadequate to determine if reported pandemics of respiratory infection were truly ascribable to influenza or not.[1]

Influenza viruses cause an acute infection of the respiratory tract. The disease affects all age groups, but children (Glezen et al. 1980), people over 60 and other high risk groups (i.e. people with asthma, diabetes, respiratory illness and immunosuppression) suffer greater morbidity from seasonal influenza (Cox and Subbarao 1999). Influenza is a major cause of death in older people. This is mainly due to serious complications, particularly in people with chronic heart and respiratory diseases (Greener 1997): one such serious complication is pneumonia (Govaert et al. 1994; Nichol et al. 1998; Nichol 2001). Very young children, pregnant women, diabetics, asthmatics, smokers, those with COPD, cardiac disease, renal disease, neurological disease and people who are immunosuppressed/immunocompromised are also more likely to suffer seriously from influenza and have higher mortality rates than the general population. People from lower socioeconomic groups are more likely than people from higher socioeconomic groups to be part of a young family, to live in conditions of high density, and to have associated risks of developing comorbid conditions or to engage in behaviour, like smoking, that increases their general risk of morbid outcomes (Van Tam 2010).

In the UK alone, it is reported that seasonal influenza accounts for on average 12,000 excess deaths per year (Puleston 2010): between 250,000 and 500,000 people die worldwide every

[1] The influenza virus was first identified in 1933 but later work with survivors and stored tissue samples was able to confirm the viral cause of the pandemics of 1889-90 and 1918-19. Claims about the identity of previous pandemics rest on clinical descriptions whose reliability and validity are uncertain.

year from influenza. Seasonal influenza viruses have been reported as infecting between 5% and 15% of unvaccinated adults (Watson 2009; Salgado et al. 2002). Influenza pandemics (even mild influenza pandemics, such as 2009-10 H1N1) often cause high mortality among young people resulting in a high level of 'Years of Life Lost' (Viboud et al. 2010). Furthermore, there is some evidence that the estimated overall total disease burden of influenza during the 2009-10 pandemic, measured in QALYs, 'was substantial when compared to other infectious diseases' (van Hoek et al. 2011: 1). In human history, influenza is arguably the greatest killer among infectious diseases because of its recurrent epidemic activity, with even higher mortality rates than the great plague of Justinian, the Black Death (Bollett 2004), HIV and malaria (Quinn 2008).

Influenza has the highest annual morbidity of a vaccine preventable disease. This is partly because of the limitations of the vaccines and partly because of the variability of the immune response generated in the recipients. Due to the lead-time during manufacture, seasonal vaccines have to be developed afresh each year based on annual 'best guesses' from the WHO (in February for the northern hemisphere) about the strains that are likely to be in circulation eight to twelve months later (from October in the northern hemisphere). The accuracy of this prediction varies so that individuals may receive a vaccine that does not closely match the virus strains that they are actually exposed to. There may also be small variations between the vaccines produced by different manufacturers using different technologies. Vaccines are less effective in some individuals, with elderly, weak or compromised immune systems, who are, of course, also those at higher risk of serious adverse consequences if they do contract influenza. Those who most need the protection of a vaccine may be the least likely to benefit.

This is one reason why influenza vaccination of HCWs is potentially so important, as an indirect means of protecting those individuals who cannot be directly protected by vaccination.

Influenza immunisation is most effective in healthy adults during winter influenza seasons when there is a close antigenic match between the seasonal influenza vaccine and the particular influenza strain circulating that season (Talbot et al. 2010); it is claimed that a poor antigenic match occur approximately once every ten years (Nicholson 1999). It has been reported that HCW vaccination is 85-90% effective in preventing infection with a closely matched vaccine (Nichol 2008; Hayward et al. 2006; Pearson, Bridges and Harper2006; Nichol et al. 1995; Wilde et al. 1999). However, a systematic review by Osterholm et al (2012a) found that the efficacy of the influenza vaccine was only moderate, with approximately 60% protection at best (i.e. in healthy adults). There is substantial variability in estimates of influenza vaccine effectiveness, driven mainly by the difficulty of perfecting methodological approaches and the underpinning variability in vaccine-virus matching (Beyer et al. 2013).

Healthcare Workers' Transmission of Influenza

HCWs have long been suspected to be a significant vector for the spread of influenza infection but this has only recently been confirmed (Kuster et al. 2011). Up to 25% of HCWs are believed to contract influenza during each winter season (Salgado et al. 2002; Elder et al. 1996). Of these, up to 75% continue working while infected, and infectious, causing nosocomial influenza outbreaks in healthcare facilities (Weingarten et al. 1989). Hospital-

acquired influenza may cause up to one third of all cases in a given season (Salgado et al. 2004; Clynes et al. 2005).

HCW immunisation is, then, thought to be an effective method of stopping the spread of influenza (Van Essen 2003); HCWs are generally at higher occupational risk of exposure, contraction and transmission of influenza (Elder et al. 1996; Martinello et al. 2003; Horcajada et al. 2003; Pachucki et al. 1989), which is a danger to both staff and patients (Weingarten et al. 1988a; Yassi et al. 1993); working in a hospital is a risk factor for influenza (Weber, Rutala and Schaffner 2010); hospitals, and their associated physical spaces and enclosed structures, as semi-closed, concentrated communities are implicated in the transmission of influenza (Beveridge 1977; Rushing 1995; Van Tam 2010); frontline HCWs are the HCW group at highest risk of contracting and transmitting influenza; nurses in particular are vectors of influenza to patients (Pachucki et al. 1985; Doebbeling et al. 1997; Nichol and Hauge 1997; Harbarth et al. 1998; Nicholson 2000); HCWs are at risk of morbidity (Berlinberg et al. 1989) and absenteeism from influenza infection; patients may be at high risk of morbidity and mortality from the complications of nosocomial influenza infection in acute-care hospital settings (Salgado et al. 2002; Maltezou et al. 2003); healthcare organisations are also at risk from staff shortages, bed pressures, increased staffing costs and inability to deliver quality healthcare due to healthcare associated influenza infection (Nichol et al. 1994; Wilde et al. 1999; Saxén and Virtanen 1999), particularly during epidemics and pandemics; HCWs continue to work while ill (Immunisation Practices Advisory Committee 1984; Wilde et al. 1999; Lester et al. 2003; Weingarten et al. 1989); some HCWs may be subclinically infected with influenza (Elder et al. 1996; Nguyen et al. 1999; Loeb et al. 2009; Williams et al. 2010) and still transmit the virus to

others (Wilde et al. 1999; Dash et al. 2004); many HCWs are unaware that they could have subclinical influenza or transmit the infection influenza while in the pre-symptomatic stage of the illness (Carman et al. 2000; Salgado et al. 2004; Munoz et al. 1999; Potter et al. 1997a,b).

Other Infection Prevention and Control Measures

HCW immunisation is only one of many preventive measures that healthcare organisations can implement to limit the transmission of influenza including: other infection prevention and control procedures (such as hand and environment washing, rapid anti-sepsis, respiratory etiquette, wearing masks, gloves and aprons), redeploying HCWs who have not received influenza immunisation, and cohorted care during influenza outbreaks, epidemics and pandemics (Salgado 2001; Talaat et al. 2011; Dolan et al. 2012a, b; Dolan et al. 2013; Kuster et al. 2013). However, compliance with IPC procedures, by HCWs, other staff, patients and visitors, is problematic. Moreover 'Kotsimbos and colleagues (2010) have lamented that the lack of specificity of the "clinical syndrome of influenza like illness (ILI) is a major problem for infection control measures."' (Jutel and Banister 2013: 17). Influenza-like illness (ILI) refers to numerous conditions (including influenza itself) whose symptoms match those widely considered to be indicative of influenza infection. ILI is a widely used term because influenza is rarely serologically confirmed. [2]

[2] Chapter Six considers the difficulty that HCWs have in correctly diagnosing influenza infection, as distinct from other ILIs.

Evidence on the Effectiveness of Healthcare Worker Influenza Immunisation

Immunisation is considered to be a safe and effective preventive health medical procedure, which can reduce absenteeism for HCWs (Nichol 2008; Nichol et al. 2009), and morbidity and mortality for HCWs and patients (Gross et al. 1995; Howells et al. 1975; Gross et al. 1988; Weingarten et al. 1988b; Potter et al. 1997a, b; Carman et al. 2000; Lemaitre et al. 2009), particularly high-risk patients (Potter et al. 1997a,b; Carman et al. 2000; Elder et al. 1996; Nichol et al. 2003; Wang et al. 2007). It has been argued that HCW influenza immunisation (Burls et al. 2006; Carlson et al. 2010), is the most cost-effective preventive health measure (Russell 1995; Nossal 2013), particularly during pandemics: 'The evidence suggests that vaccination of HCWs is likely to be cost saving or, at the very least, highly cost-effective (for comparison note the UK NICE Appraisals Committees consider that costs as high as £30,000/QALY represent value for money)' (Burls et al. 2006: 4220).

Nevertheless, there is still debate over the value of vaccinating HCWs against influenza. Chan (2007, 2008) and Thomas et al. (2006) have argued that there is a lack of evidence of the direct benefit of vaccinating HCWs. However, a considerable number of studies advocate the benefits of immunizing HCWs. Lemaitre et al. (2009) conducted a pair-matched cluster-randomized trial of the effect of HCW vaccination on all cases of morbidity in a nursing home. They found 20% lower mortality and 31% lower ILI illness in nursing home residents where the HCWs had been vaccinated. Similarly, Hayward et al. (2006) conducted a cluster randomised controlled trial and reported a significant reduction in the incidence of influenza-like infections, the number of medical consultations and hospital admissions, and mortality. They claimed that there was a one in eight and one in five reduction in mortality and morbidity, respectively, for every HCW vaccinated against influenza. Potter et al. (1997a, b)

found a significant reduction in patient mortality and ILIs. Carman et al. (2000) also conducted a randomized trial and found significantly lower mortality of residents but not significantly lower morbidity. Burls et al. (2006) conducted a systematic review and economic evaluation of the evidence on whether vaccinating HCWs is a good use of healthcare resources. They looked at 18 studies and concluded that vaccinating HCWs against influenza is highly effective, has minimal adverse effects and is a good use of healthcare resources. They admit, however, that their review is limited to the extent that there was a lack of information on the primary outcome of providing indirect protection to high-risk patients, considered by only two studies, Carman et al. (2000) and Potter et al. (1997a). Furthermore, immunisation is only cost-effective when an optimal programme can be delivered.

Several other studies have argued that HCW vaccination reduces influenza-related mortality and morbidity of both patients (Potter et al. 1997a, b; Carman et al. 2000; Nichol et al. 2003) and staff (Gross et al. 1995; Howells et al. 1975; Gross et al. 1988; Potter et al. 1997a; Carman et al. 2000). A systematic review for the WHO (Dolan et al. 2012 a, b; Dolan et al. 2013) considered 20 studies and found that 'Evidence is limited for the effectiveness of vaccination of HCWs for protecting patients at higher risk for severe or complicated respiratory illness' (Dolan et al. 2012b: 1231). Similarly, Thomas, Jefferson and Lasserson (2013) conducted a systematic review on 'influenza vaccination for healthcare workers who care for people aged 60 or older living in long-term care institutions', and found insufficient evidence to support immunisation of HCWs against influenza. Ahmed et al (2014) conducted a systematic review of four cluster randomized trials and four observational studies conducted in long-term care or hospital settings. They found 'no evidence that vaccination of HCWs decreases the

frequency of laboratory-confirmed influenza in patients'. However, they did find 'that vaccination decreased all-cause mortality among patients (a 29% relative risk reduction) and influenza-like-illness by 42%' (Born, Ikura and Laupacis 2014: 1). They proposed that: 'laboratory-confirmed influenza has major limitations as an outcome measure, and that all-cause mortality is a more appropriate outcome measure, given its obvious clinical importance and the broad clinical impact of influenza on sick, elderly hospitalized patients' (Born, Ikura and Laupacis 2014: 1).

While the evidence for the effectiveness of vaccinating hospital HCWs working in long-stay healthcare facilities is limited, this does not necessarily mean that it is not an effective preventive health measure, merely that it is difficult to prove one way or the other. There are significant ethical issues involved in conducting randomized clinical trials for HCW influenza immunisation (Smith and Shay 2006; Wicker et al. 2009a) and such studies are unlikely to gain ethical approval. The rationales for immunisation programmes rest, and will probably continue to rest, on uncertain foundations. The validity of these programmes will always be open to question, particularly where mandatory vaccination is proposed. In a recent policy article, Gardam and Lemieux (2015: 639-640) reported that Osterholm et al (2012b) concluded:

> …recent expanded recommendations for influenza vaccination are based on expert and organizational opinion rather than on data. They also state that systematic overestimation of vaccine effectiveness has hampered the identification of better solutions, and they call for improved vaccine development based on novel antigens.

The next section outlines the UK's policy when I conducted my fieldwork.

UK Healthcare Worker Influenza Immunisation Policy

Seasonal HCW influenza immunisation has been adopted as a desirable policy for a number of years, particularly in Western countries (Nicholson et al. 1995; O'Reilly et al. 2005), although not in China (Seale et al. 2010). In a study of 28 European countries, Nicholson et al. (1995) found that the majority promoted vaccination of HCWs. This experience is reflected in a global recommendation by the WHO that 'all countries should immunize their healthcare workers [against influenza] as a first priority to protect vital health infrastructures' (SAGE 2009; WHO 2010), including with seasonal, pre-pandemic and pandemic influenza vaccines. This recommendation has been 'constructed, reproduced and put into practice in the UK and elsewhere (Keeley and Scoones, 2003; Fairhead and Leach, 2003; Agrawal, 2005)' (Leach and Fairhead 2007:12). However, the actual practices of these immunisation programmes vary widely between countries and within healthcare organisations. These differences reflect that:

> …the nature of emerging public debates around vaccines is also deeply inflected by local and national political history and culture, and by the legacy of particular interactions between populations and institutions of the state, of science, of civil society and of the media. For while vaccination is part of globalized technological and technocratic orders, the contrasting ways that different regions, countries and localities engage with these reveal different ways that bodily, social and political orders are co-experienced, and forged in relation to them (Leach and Fairhead 2007: 25).

Since 1999 UK frontline HCWs have been prioritised, by UK and devolved national governments, for free occupational seasonal influenza immunisation. HCWs' sickness absence in the NHS has been reported as being higher in incidence (at 5%) than in other professions (at an average 3.7%) and as costing the UK NHS in excess of £700 million per year (Dargie and Dawson 2001). However, it has also been reported that HCWs are no more at risk of contracting seasonal influenza (Williams et al. 2010; Marshall et al. 2011; Seto et al. 2011), and H1N1 pandemic influenza (Kuster et al. 2013), than non-HCWs. One UK study showed that nurses' winter sickness absence was somewhat unrelated to local influenza activity and more closely related to holiday periods (Nguyen-Van-Tam et al. 1999).

Annual guidance has been issued since 2000, in the form of letters from UK Government, DH actors (the Chief Medical, Nursing and Pharmacy Officers[3] of England, Wales, Scotland and Northern Ireland), promoting HCW immunisation against (seasonal) influenza (Donaldson 2001). For example, in England in 2000 and 2001, they affirmed and re-affirmed, respectively, that:

> 'The Chief Medical Officer has recommended that Immunisation against influenza of healthcare workers should be part of winter planning for health service providers' (HSC 2000/016).
>
> 'As last year, NHS employers should offer influenza immunisation to employees directly involved in patient care' (Donaldson 2001: 4).

This has been reinforced by a statement from the GMC, to physicians in practice, that: 'You should protect your patients, your colleagues and yourself by being immunised against

[3] The role of CMO in England and Wales is intimately linked with epidemic networks, as the role was created to help prevent cholera epidemics in the mid to late nineteenth century.

common serious communicable diseases where vaccines are available' (GMC 2006). However, similar statements have not been issued by trade unions from other health professions, including the RCN and RCM (RCN and RCM personal communications to RH, 2012). The closest declaration from the NMC (2008) is included in its code, which describes the standards of conduct, performance and ethics for nurses and midwives:

> make the care of people their first concern...[and that they have the duty to] act without delay if you believe that you, a colleague or anyone else may be putting someone at risk...You must inform any employers you work for if your fitness to practise is impaired or is called into question.

Furthermore, NMC members: 'must ensure that all their decisions and actions as Trustees: contribute to the NMC's objective to protect the public; are within the NMC's obligations under the Nursing and Midwifery Order 2001 and subsequent legislation' (NMC 2008).

NHS Wales published 'Healthcare Associated Infections - a Strategy for Hospitals in Wales'[4]in September 2004, and 'Healthcare Associated Infections: A Community Strategy for Wales'[5] in 2007, which both aimed to reduce healthcare associated infections (HCAIS), including through the use of occupational influenza immunisation.

In June 2009, the JCVI advised the national governments within the UK to prioritise frontline HCWs for pandemic H1N1 influenza vaccination (JCVI 2009; Hine 2010). This advice was

[4] (http://new.wales.gov.uk/topics/health/protection/communicable-disease/healthcare-associated/?lang=en) accessed 23/4/13.

[5] http://www.wales.nhs.uk/documents/Infections-English.pdf accessed 23/4/13.

endorsed by SAGE and agreed by UK government ministers in July 2009. This pandemic immunisation programme of HCWs began in late October 2009.

Since 2011, a 50% target for frontline HCW influenza immunisation has been introduced in Wales.

Given the evidence for (or lack thereof), and policy supporting, HCW influenza immunisation, the next section considers how successful the immunisation has been worldwide.

Healthcare Workers' Influenza Immunisation Uptake

Worldwide HCW seasonal influenza immunisation rates have historically been described as low (Eisenfeld et al. 1994; Beguin et al. 1998; Carman et al. 2000; Habib et al. 2000; Dey et al. 2001; Brotherthon and Bartlett, Mark et al. 2003; Van Essen et al. 2003; Kroneman et al. 2003; Elgohari et al. 2004; Jennings, 2006; Burls et al. 2006; Byrnes et al. 2006; Yassi et al. 2010) The same assertion has also been made specifically for hospital-based HCWs (Szucks and Müller, 2005; Wicker et al. 2007; Quigley and Hayes, 2006; Esposito et al. 2007; King et al. 2006; Hofmann et al. 2006; Poland et al. 2005; Walker et al. 2006; Hallauer and Neuschaefer-Rube 2005; Leitmeyer et al. 2006; Jiménez-Garciá et al. 2006; Maltezou et al. 2007; Bull et al. 2007). Globally, figures for HCW seasonal influenza immunisation prior to the 2009-10 H1N1 pandemic were largely similar, with approximately 15% in the UK (DH/HPA 2009), 18% in

Germany[6] and Beijing (Hayward et al. 2006 and Seale et al. 2010, respectively), 20% in Italy (Esposito et al. 2008), 21% in France (Trivalle et al. 2006), 22 % in Australia (Seale, Leask and McIntyre 2009) and 25% in Romania (Kroneman et al. 2003); but were higher in Taiwan with almost 100% (Chan 2008), Canada with 55% (Health Canada, 2001), Hong Kong with 46% of nurses (Tam et al. 2008) and the US at around 36-40% (Bridges et al. 2003 and Pearson, Bridges and Harper2006, respectively), and lower in Spain at 10% (Bautista et al. 2006). The rate reportedly jumped in France from 21% (Trivalle et al. 2006) to 48% (Mereckiene et al. 2008) in just two years, or winter influenza seasons. However, worldwide studies have documented influenza immunisation rates of health professionals from 2% to 80% (Ballada et al. 1994; Heimberger et al. 1995; Watanakunakorn et al. 1993; Pachucki et al. 1989; Doebbeling et al. 1997; Begue and Gee 1998; Beguin et al. 1998; Weingarten et al. 1989; Martinello et al. 2003; Wodi et al. 2005; Hoffmann et al. 2006), with some of the highest rates recorded in the USA (Hoffmann et al. 2006).

H1N1 pandemic vaccine uptake in 20091-10 was also regarded as low (Poland 2010) or suboptimal (Bish et al. 2010a). During the H1N1 influenza pandemic of 2009-10, levels of influenza vaccination among health professionals were still characterized as low. In the UK, the figure was reported to have increased to around 40% for the pandemic vaccine (DH, 2010b), with 40% for England, 55% for Scotland, 48% for Northern Ireland (McClean and Peabody 2010), and 33% for Wales (PHW 2010). In the USA the figure reported was 37% (CDC 2010). Bish et al. (2010a) stated that Southern and parts of Eastern Europe had the lowest

[6] German uptake rates have been reported as unusual in that they are lower than the rate for non-HCWs of 24% (Hayward et al. 2006).

rates; for example, the Czech Republic with less than 10%. However, Mereckience (2010) reported that Hungary had 70% and Romania just over 50%; while Italy and Spain had around 15% and 12%, respectively. Differences in uptake rates during the pandemic were also reflected in the different national responses to the pandemic (Poland 2010) and the vaccination policies adopted (Bish et al. 2010a). Some countries 'aimed to vaccinate the entire population whereas others targeted vaccination at particular groups (children, people with chronic disease, pregnant women [and HCWs]' (Bish et al. 2010a: 6).

What constitutes a high or optimal immunisation rate, however, is not clear from these studies. Glezen (2006) states that a certain level of uptake is required to protect patients and other HCWs, and a figure of 50% has been proposed by others (Wicker et al. 2007; van Delden 2008). However, Van den Dool et al. (2008a) employed a mathematical model to reveal a linear relationship between HCWs' immunisation and influenza infections among patients, but no threshold for herd immunity[7] could be detected. Flegel (2012: 1873) stated that 'The participation rate needs to be above 90% to prevent importation and to interrupt transmission within a hospital', but no evidence is given in this brief editorial for this assertion; whereas, Winston, Wagner and Chan (2014) estimate and the US CDC recommends that 80% need to be vaccinated (Stuart 2012). For non-HCW populations, Arden et al. (1993) found an 80% herd immunity effect among nursing home residents. Dolan et al (2012b: 1232) found that:

[7] This is the level of vaccination coverage that is required in order for those who are not vaccinated to be protected against infection. This protection is achieved by slowing down or stopping the spread of the disease.

> Realistically, herd immunity is difficult to achieve in health care settings, especially acute care short-stay settings, because of patient admissions and discharges, visitors, and staff turnover. That said, herd immunity might not be necessary to benefit patients; modeling studies (*39*) suggest a direct association between coverage and attack rates. Such studies (*39*) also suggest variation in the potential for transmission of infection by different staff groups, which should be explored in further detail.

There is also no clear evidence as to whether herd immunity is better achieved with live attenuated influenza vaccines than with inactivated influenza vaccines (Kim, Johnstone and Loeb 2011). Subsequently, herd immunity is not considered a viable strategy for influenza immunisation.

The next section considers how previous research has explained these uptake figures.

Explaining Healthcare Workers' 'Low' Uptake of Influenza Immunisation

Previous research has found that factors affecting non-uptake of influenza vaccines among health professionals are complex (Hollymeyer et al. 2009): fear of side effects, including causing influenza illness (Ballada et al. 1994; Heininger et al. 2003; Martinello et al. 2003; Qureshi et al. 2004; O'Reilly et al. 2005; Wicker et al. 2009a); belief that influenza vaccines are ineffective (Goldstein et al. 2004; Weingarten et al. 1989; Christini et al. 2007; Pearson, Bridges and Harper2006; Canning et al. 2005; Qureshi et al. 2004; Saluji et al. 2005; Bautista et al. 2006; Martinello et al. 2003; Nichol et al. 1996); vaccine accessibility and convenience (Pachucki et al. 1989; Weingarten et al. 1989; Decker and Schaffner 1990; Girasek 1990; Ohrt

and McKinney 1992; Watanakunakorn et al. 1993; Heimberger et al. 1995; Adal et al. 1996; Fedson 1996; Doebbeling et al. 1997; Nichol and Hague 1997; Harbath et al. 1998; O'Reilly et al. 2005; Christini et al. 2007; Wicker et al. 2009a); and, insufficient knowledge about influenza as a serious disease (Stephenson et al. 2002; O'Rorke et al. 2003; O'Reilly et al. 2005; Wicker et al. 2009a). Both Heininger et al. (2003) and Wicker et al. (2009) identified the lack of health professionals' understanding about the risks, efficacy and necessity of influenza vaccination as the primary factors influencing the non-uptake of the vaccination among health professionals. Previous research has also found that HCWs accept seasonal (Stephenson et al. 2002; Bucholz et al. 2002; Stephenson et al. 2002; Lester et al. 2003; O'Reilly et al. 2005; Hofmann et al. 2006l Maltezou et al. 2008; Pareek et al. 2009; Wicker et al. 2009a) and pandemic influenza immunisation (Miyakis et al. 2011) to protect themselves, rather than their patients. This is particularly important since most influenza vaccination programmes are promoted to HCWs in terms of their usefulness in protecting patients rather than the staff themselves. Ohrt and McKinney (1992) reported higher uptake with larger cohorts, perhaps pointing to the importance of social norms in vaccine acceptance. Abramson and Levi (2008) propose that senior HCWs, and O'Reilly et al. (2005) and Qureshi et al. (2004) highlight that OH units advocating influenza immunisation, can have a positive effect on uptake rates. However, Yassi et al. (1994) reported that the role of OH as advocates is limited.

Other studies (Seale et al. 2010; Trivalle et al. 2006; Martinello et al. 2003; Cowen et al. 2006) have emphasized the differences in reported reasons of non-uptake of influenza vaccination between doctors and other HCWs, and between genders (Qureshi et al. 2004). Yassi et al.

(2010) found that HCWs would like vaccination campaign materials which are produced at an appropriately scientific level for them, rather than simplistic information sources aimed at the lay public. Yassi et al. (2010) also found that HCWs felt that vaccination campaigns were conducted in isolation from other IPC campaigns and that vaccination should be more conveniently available, such as in the workplace (Pachucki et al. 1989; Doebbeling et al. 1997; Harbath et al. 1998; Ohrt and McKinney, 1992; Decker and Schaffner, 1990; Girasek, 1990; Adal et al. 1996; Fedson, 1996). This is consistent with other studies which have found that the general safety culture of an organization is an important determinant of staff compliance with safe work practices (Moore et al. 2005; Gershon et al. 2000; Clarke et al. 2002; Yassi and Hancock, 2005).

Pareek et al. (2009) explored potential reasons for HCWs' acceptance and refusal of pre-pandemic vaccines. They found that high media coverage, acceptance of previous seasonal influenza vaccine, belief that seasonal vaccine will benefit them, the risk of a pandemic is high and that HCWs would be at risk from such a pandemic were the key factors in pre-pandemic vaccine acceptance. Not perceiving pandemic influenza as a serious threat and concerns around pre-pandemic vaccine safety were the major factors involved in pre-pandemic vaccine refusal. They concluded that 'Improving coverage of seasonal vaccine would increase pre-pandemic vaccine uptake if a proactive priming strategy was implemented' (Pareek et al. 2009: 2). Given the link between seasonal and pre-pandemic acceptance, Pareek et al. (2009: 9) suggest that 'if barriers to administration of seasonal vaccine can be overcome, it will improve seasonal vaccine coverage, and is likely to increase pre-pandemic vaccine uptake'. Chor et al. (2009) also found that acceptance of pre-pandemic vaccines was associated with

perceived risk of catching the virus, seasonal vaccination, fears about side effects and vaccine efficacy doubts.

Like seasonal and pre-pandemic vaccines, concerns about vaccine safety (Kaboli et al. 2010; Miyakis et al. 2011), fear of side effects (particularly Guillain-Barre Syndrome[8] (GBS)) (Eames et al. 2010; Maltezou et al. 2010; Rachiotis et al. 2005 and HCWs not considering themselves to be at risk of contracting pandemic influenza (Maltezou et al. 2010; Virseda et al. 2010; Eames et al. 2010; Poland et al. 2010; Rachiotis et al. 2005; Steelfisher et al. 2010) and to be a serious illness risk to them (Dube et al. 2010; Kaboli et al. 2010; Rachiotis et al. 2005; Miyakis et al. 2011) were the strongest reasons for refusal of pandemic vaccine. HCWs have put forward that pandemic influenza vaccine safety information was insufficient (Maltezou et al. 2010; Rachiotis et al. 2005; Miyakis et al. 2011) and that the most used source of information was the media (Rachiotis et al. 2005; Miyakis et al. 2011); this source of information was associated with an increased refusal of vaccination due to fear of side effects, while medical sources of information were independently associated with pandemic vaccine acceptance (Rachiotis et al. 2005; Savas and Tanriverdi 2010).

Several studies (Yassi et al. 1994; Heimberger et al. 1995; Nichol and Hauge 1997; Stephenson et al. 2002; Rachiotis et al. 2005; Maltezou et al. 2008; Chor et al. 2009; Maurer et al. 2009; Sypsa et al. 2009; Eastwood et al. 2010; Kaboli et al. 2010; Schwarzinger et al. 2010; Seale et al. 2010; Van et al. 2010) worldwide found that HCWs' acceptance of pandemic influenza

[8] This may be related to perceived high levels of GBS among recipients of influenza vaccine during 1976 (Pachucki and Jackson 1985; Safranek et al. 1991).

vaccines was strongly correlated with acceptance of seasonal influenza vaccine. However, some UK acute trusts and PCTs reported higher levels of HCW pandemic than seasonal influenza vaccine uptake. Low levels of pandemic influenza vaccine uptake and high levels of seasonal influenza vaccine uptake among health professionals were rare but still need investigating.

Origins of this Study

Previous research into HCWs' attitudes to influenza vaccination has, then, concentrated on investigating individual decision-making and reasons for acceptance or non-acceptance of this preventive health measure. Most of the studies have assumed that the reasons for non-uptake are to be found at the 'micro-level', in individual motivations, rather than at the 'macro-level' of policy formation or the 'meso-level' of organization and delivery of vaccines to potential recipients. The studies tend to have been developed within an administrative rather than a theoretical framework (Lachman 2002; Michie and Abraham 2004; Bish et al. 2010a): none appears to have been undertaken from an explicitly sociological perspective.

This deficit was recognized by my doctoral supervisors while the 2009-10 H1N1 influenza pandemic was still taking place in the UK. My supervisors had worked together for some time on influenza related projects, combining medical and social science approaches to PH problems. They recognized the policy concern about the poor performance of HCW influenza immunisation programs across the EU (e.g. The HProImmune programme www.hproimmune.eu). This led to an application for a joint doctoral studentship from the

ESRC and the MRC in order to conduct 'An investigation of health professionals' non-uptake of H1N1 pandemic influenza vaccine during the 2009 pandemic'. They intended to adopt a sociological approach because the dominant medical and psychological framing of the problem as one of lack of compliance by HCWs had failed to generate appropriate policy solutions. As is usual with such scholarships, this set a broad direction before I was offered the opportunity to develop it further.

My specific contributions lay in the adoption of Actor-Network Theory (ANT) as an approach and the choice of Wales as a fieldwork site. This ANT-informed, sociological approach provides a different, and in-depth, perspective on the HCW influenza immunisation programme. It facilitates the study of unstable objects/hybrids, like influenza viruses and vaccines. ANT will be discussed in more detail in the next chapter. For now, it is sufficient to note the way in which this reframed the problem from one of why HCWs did not choose to be vaccinated to one of how the vaccine came to reach, or fail to reach, the arms of the HCWs for injection. This project became a study of the vaccine's journey to the HCWs, or at least of the part of the journey that fell within the orbit of the NHS. Wales was chosen as a fieldwork site, partly for reasons of convenience but mainly because the small scale of the health system meant that it was easier to follow the vaccine than would have been the case in England. However, it will be argued, in the conclusion, that the processes involved are not fundamentally different in any healthcare system, although some of the structural details may vary in ways that facilitate or obstruct the vaccine journey.

Given this approach, the research aim, objectives and primary question are outlined below.

Research Objectives

Primary Objective

To investigate the reasons for the reported level of uptake of seasonal and pandemic influenza vaccines by HCWs in Wales during and following the 2009 influenza pandemic.

Secondary Objective

To consider the implications of the findings from the primary research objective for public policy concerning the vaccination of health professionals against seasonal and pandemic influenza, and other infectious diseases.

Research Aim and Primary Research Question

My research questions evolved in tandem with my adoption of ANT as a conceptual framework. During the course of the study, I decided that this immunisation programme is best understood as an actor-network. This was prompted by the documents and informant accounts that I collected and generated, respectively, which led me to recognize the dynamic and heterogeneous nature of the HCW influenza immunisation programme. While, as a PH study, I would expect my work to inform debate and policy on promoting HCW influenza vaccination, my primary aim is to understand the phenomenon of uptake by mapping the

journey that influenza vaccines take to reach HCWs as vaccinees. As Leach and Fairhead (2007: 12) note,

> in my analysis of [HCW] worlds, rather than start with a (policy-driven) question such as 'why do [HCWs accept,] demand or refuse vaccination?', my ethnographic approach starts from considering [HCWs'] broader perspectives on [being a good HCW in the hospital setting], and how vaccination fits into this.

This study, therefore:

> follows a strong tradition of ethnographies of technologies-in-use, and their users, attentive to the specificity of located knowledge and practice, and the specific transformations of meaning that technologies undergo in social settings (Richards, 1985; Latour, 1987; Fairhead and Leach 1996; Mol, 2003) (Leach and Fairhead 2007: 12).

ANT directs research, and policy, away from the narrow question of 'Why do HCWs accept, demand or refuse vaccination?' to locate this decision within an organized social system that presents them – or does not present them - with opportunities to make this decision within variable contexts of knowledge and practice. In particular, it relocates the focus of the study away from the individual HCW to the vaccine and the way that it comes to reach the HCW within a particular structural, cultural and organizational context: in some cases, of course, its journey through the network to the point of action is blocked so the question of HCW willingness never actually arises. Consequently, the primary research question that I developed during the course of this study is: How do vaccines travel within the Welsh NHS from the point at which they are ordered to their insertion, or non-insertion, into HCWs?

At the end of the next chapter when the theoretical approach, ANT, and its terminology, have been introduced, the primary research question is translated into several ANT-informed research questions.

Answers to these research questions and objectives, and a thick description of the network and influenza vaccines' journeys into HCWs are provided in the proceeding eight chapters, which are outlined below.

Thesis Structure

The next chapter, Chapter Two, describes the theoretical framework and methodology used in this study, namely Actor-Network Theory (ANT). Chapter Three describes the methods used to generate the data (i.e. interviews, focus group discussions and documentary analysis), and the sampling and analytic strategy, which are informed by ANT.

The empirical data generated in this study are furnished over four chapters, which examine different parts of the network, to provide an ANT-informed analysis of this immunisation programme. Chapter Four, the first of these empirical chapters, considers the national and international parts of the network (i.e. the beginning of the vaccine's journey from the pharmaceutical company). I explore the legislation and policy, or lack of, supporting this immunisation programme in Wales and the UK. The second empirical chapter, Chapter Five, looks at the LHB-level (i.e. influenza vaccines' journeys into individual hospitals through the

work of LHB actors). I explore the translation of the legislation and policy embedded in this immunisation programme, by LHB HCWs whose role is to implement these policies. Chapter Six, the third empirical chapter, concerns the final part of the vaccines' journeys (i.e. to healthcare professions, departments, teams and individual HCWs'). The final empirical chapter, Chapter Seven, considers the normative issues raised in the previous three empirical chapters, and examines the ways in which values can become enrolled as actants in actor-networks, with implications for the outcome. Chapter Eight brings together the empirical findings from the four previous chapters to answer the research questions and to map this dynamic actor-network (including a consideration of the bioethical issues more explicitly as part of the network that I have mapped). The theoretical and policy implications emerging from these findings are then considered, before the future of the network is contemplated. The final chapter in this thesis, Chapter Nine, is where the study is evaluated including rigour, and the philosophical, theoretical, methodological, analytical and practical limitations, in the study. I also consider whether I have produced a good ANT account, what this means and my novel contribution to knowledge.

Chapter Two

Actor-Network Theory

Introduction

Chapter One summarized what is known from previous studies about the epidemiology of influenza, the role of HCWs in its transmission and their participation in vaccination programmes. It also described current UK policy on HCW vaccination and the concern over what was seen to be a low uptake within front-line NHS organisations. It noted that most of this research framed the problem of HCW compliance as one of individual motivation, and that this was reflected in the policy measures that emphasised institutional pressures on HCWs to come forward for vaccination, either as a moral or a contractual requirement. This is very typical of traditional styles of research into 'social problems', which frame these as issues of individual deviance rather than of culture or social organization.

Sociology, however, has a long-standing alternative which argues that social problems should be understood not as questions of personal pathology but as the outcome of processes by which some social actors, 'moral entrepreneurs', claim that some set of circumstances are problematic by reference to a set of normative judgements that they assert should be acknowledged by all right-thinking people (Fuller, 1937; Fuller and Myers, 1941; Waller, 1936; Berger and Luckmann, 1966; Blumer, 1971). Social problems have to be recognized, their nature has to be formulated and their shape described in such a way as to provide for a set of solutions acceptable to the promoters. Objective conditions, then, are not the primary focus of sociological investigation: 'On the side of sociological theory, knowledge of the objective makeup of social problems is essentially useless. It is useless because, as I have

sought to show, social problems do not lie in the objective areas to which they point but in the process of being seen and defined in the society' (Blumer 1971: 305-6). At best, a description of objective conditions can identify a latent social problem: many such problems are, however, never successfully made manifest and brought onto the public agenda as a basis for policy interventions.

In the present case, I can note that influenza vaccines have been available since 1938 and have been used since World War II. However, HCW immunisation uptake was not considered to be a problem for health system policy in the UK until the 1990s and an immunisation programme was introduced in 1999. Although there was some concern about uptake, the problem did not rise up the policy agenda. As noted in the previous chapter, there was little attempt to determine what was meant by 'low uptake' and what would constitute 'adequate' or 'good' uptake, in terms of herd immunity or otherwise. Moreover, there was limited interest in collecting evidence of the effectiveness of HCW influenza immunisation in preventing transmission of influenza to patients and to other HCWs. Policymakers only initiated large scale action, in the form of organisational targets and changes to the delivery of immunisation programmes, after the 2009-10 H1N1 pandemic.

Conventionally, studies in the sociology of social problems take the process of moral entrepreneurship as their focus, often through ethnographic studies of the promoters of the problem, and of their contests with others to define and shape societal responses and the allocation of material or symbolic resources to possible solutions (Loseke 2003; Spector and Kitsuse 1977). However, this tradition has two important limitations. The first is that it tends to position the people who are represented as problematic, or as the victims of problematic

circumstances, as passive in the face of the moral entrepreneurs unless they are very obviously engaged in some form of counter-mobilization. This reflects the history of the field, where many studies have questioned the stigmatization of various socially marginalized or excluded groups, such as drug users, sex workers or petty criminals without necessarily challenging their marginalization (Becker 1965; Best 1999). In the present case, HCWs have rarely mobilized against the pressures to accept immunisation but their resistance has been assumed rather than investigated. The second limitation has been the separation between the social problems tradition and the studies of trouble in complex socio-technical systems, such as those involved in the introduction of scientific and technological innovations. There is some overlap in areas like reproductive technologies, where different normative visions are very apparent and where there is a long history of work on abortion and contraception as social problems (Ball 1967; Fuller and Myers 1941; Luker 1984). Nevertheless, it is apparent that topics like the controversies over genetically-modified crops, where disputes embrace technologies as well as human actions, have been difficult to accommodate within traditional social problems models (Bonneuil Pierre-Benoit and Marris 2008).

While taking inspiration from the social problems tradition, then, this study has adopted a more recent approach in the form of actor-network theory (ANT). While this sits within the same intellectual family, it makes fewer assumptions about definers and defined. In effect, vaccine uptake is to be analysed as a co-production rather than as a problem formulated by one group at the expense of another. I may conclude that this is what has happened but I do not start from that point. The second is its flat ontology between human and non-human participants in networks. This will be discussed in more detail later in this chapter. For the present, it is enough to say that it accommodates one common way of formulating the

inevitability of a policy response – in this case that the 2009-10 H1N1 pandemic led policy actors to redefine the status of HCW vaccine uptake as a more substantial problem than they had a decade earlier. Another way of putting this is to see the virus as an actor – or more precisely, in terminology I shall also explain – as an *actant* that brought about this change.

While this study is, ultimately, addressed to the policy objectives set out in the previous chapter, its original contribution lies in the reframing brought about by the adoption of an ANT approach. A traditional sociology of social problems study would have concentrated on the construction of policies and the attribution of a normative judgement – 'high' or 'low' to the HCW immunisation rate. It would have addressed questions like: who says this is a problem? What kind of a problem do they say it is? What kinds of solution are they proposing? Who benefits from defining the problem in *this* way rather than in *that* way? Such studies often result in some kind of ironical contrast between what the moral entrepreneurs claim they are trying to achieve and what the outcomes actually are. The present study sets these questions to one side through its focus on 'what's going on here' and a narrative organised around the vaccine's journey through the Welsh NHS and into some, but not all, of its intended targets. How do social, cultural and material elements interact to create and shape this pathway?

Before embarking on this analysis, however, it is important to introduce the way of thinking represented by ANT and to explain some of the key vocabulary that will appear throughout the thesis. This is the objective of the remainder of the chapter. At its conclusion, I will return to the research question that I set out at the end of the previous chapter, partly to rephrase it in a more specific and technical fashion, now that I have introduced the relevant

terminology, and partly to show how they connect to the more general strategy implied by the approach. I will then go on in the next chapter to set out the consequences for how I went about generating the data.

What is Actor-Network Theory?

The actor-network approach was developed during the 1980s by Michel Callon and Bruno Latour, in France, and by John Law, in Britain (Callon and Latour 1981; Latour 1987; Latour 1988b; Callon 1986a and 1986b; Callon 1987; Callon et al. 1986; Law 1986b; Law 1987). ANT originated as part of a critique of previous work in the sociology of science, which had investigated the social conditions for the production of scientific knowledge but had little to say about the actual production of the knowledge itself (Barnes, Bloor and Henry 1996; Merton 1973). ANT draws on a number of micro-sociological traditions, including social phenomenology, symbolic interactionism and ethnomethodology (Law 1992; Latour and Woolgar 1979. However, it differs in its approach to agency, which is not considered to be exclusively a property of humans but may also attach to non-human, material or virtual, objects or to hybrids that combine human and non-human elements. It was intended to offer a way to: '…analyse situations in which it is difficult to separate humans and non-humans, and in which the actors have variable forms and competencies' (Callon in Law and Hassard 1999: 183).

ANT sees 'society as a complex and fluid set of heterogeneous networks (Latour 2005)' (Cloatre and Dingwall 2013: 7). Society is co-constructed through human, non-human and hybrid interactions from which the meaning of events or points in the network emerge (Callon and Latour 1981).

Although generally described as Actor-Network *Theory*, there is actually some dispute as to whether it is best considered as a theory, a method or something in between. Callon, for example, asserted that: 'ANT's main shortcoming is that it is everything but a theory – which explains why it cannot explain anything!' (Callon in Law and Hassard 1999: 182). Nevertheless, he also declared, in the same chapter, that: 'ANT is not a theory. It is this that gives it both its strength and its adaptability' (Callon in Law and Hassard 1999: 194).

Others have approached ANT 'as an ensemble of sensibilities for research' (Law 2009a,b; Baiocchi, Graizbord and Rodríguez-Muñiz 2013; Law and Singleton 2013:7):

> Perhaps, then, ANT isn't a theory. Perhaps it is better thought of as a sensibility to the materiality, relationality and uncertainty of practices, as a way of asking how it is that people and animals and objects [and discourses] get assembled in those practices, and as a way of mapping the relations of practice.

The present study takes ANT as a sensibility in this fashion, which then orients its methodological choices (discussed in the next chapter) and its use of theoretical language to assemble the relationships and entities that it identifies.

Latour (1988a) articulated the philosophical (i.e. epistemological and ontological) basis for the ANT approach, that the world of experience is constituted from networks of relationships. ANT has a distinctively 'flat' ontology, where material objects (human, non-human and hybrid) and semiotic objects (for example, ideas, values and concepts) are considered to be entities of the same status and similarly capable of forming associations with each other. The entities derive their meaning and status from their relationships with each other in particular

networks of association rather than these being inherent and fixed properties: 'For Callon, discourses are performative in the sense that they participate in enacting the realities that they describe' (Cloatre 2014: 42). Latour has proposed, for example, that 'the couple human/non-human should be substituted for the insurmountable dichotomy between subject and object (see Latour, Politics of Nature)' (Latour 2005: 72). Terms like human/non-human or nature/culture can only be understood in their relationship to each other. ANT can, then, be thought of as a form of relational materialism (Prout 1996).

ANT differs in two important respects from other network theories, which have been used in the social sciences since at least the 1950s.[9] These are the inclusion of, and agency ascribed to, non-human and hybrid actors, and the emphasis on contingency and instability: 'Network at the time clearly meant a series of transformations – translation, transductions -; now, on the contrary, it clearly means a transport without deformation, an instantaneous, unmediated access to every piece of information' (Latour 1999: 15). Latour (2005: 131) emphasizes that 'network' is a metaphor in ANT, rather than the actual thing which is being described:

> So, network is an expression to check how much energy, movement, and specificity our own reports are able to capture. Network is a concept, not a thing out there. It is a tool to help describe something, not what is being described ... a network is not what is represented in the text, but what readies the text to take the relay of actors as

[9] Citations to Moreno, JA Barnes, J Clyde Mitchell, Castell. Also Simmel *Web of Group Affiliations*

> mediators. The consequence is that you can provide an actor-network account of topics which have in no way the shape of a network.

Networks are `the summing up of interactions through various kinds of devices, inscriptions, forms and formulae, into a very local, very practical, very tiny locus' (Latour 1999: 15). This does not mean that they are necessarily fixed in time, space or place. Euclidian geography may be of great importance in some networks and of little importance in others (Latour 1993; Murdoch 1998). With globalisation and the increasing use of information technology to associate, some networks may be becoming increasingly detached from any specific locus.

Latour (2005) also explores other metaphors that capture different aspects of his approach. He suggests, for example, that 'worknet' might be a more apt description, underlining how actants work to achieve temporary stability in the net for immediate and practical purposes, joining and leaving the net as their associations change over time. The term 'net' also projects the idea that nets can intersect each other, so that an entity is always constituted by multiple associations and potentially participates in multiple realities or multiple versions of reality. Alternatively, he offers the metaphor of a 'fluid' because 'The word 'fluid' allows analysts to insist better than if they used the word network on the circulation and on the nature of what is being transported' (Latour 2005: 65). Associations are called into being for action, for the movement of entities. In other comments, Latour (2005) jokingly suggested that 'actant rhizome ontology' would be a more fitting name than actor-network theory. The imagery of 'rhizome' challenges the neatness of the network metaphor: associations are more like a tangled mass of roots than the straight lines of engineers or mathematicians. Actant is more generally preferred to 'actor' in ANT because it is seen as less anthropocentric. It breaks with

'the influence of what could be called 'figurative sociology'' (Latour 2005: 54) by insisting on the ontological equivalence of all the entities – human, non-human and hybrid - that associate with each other (Callon 1986a; Latour 1992; Law 2008). This follows from ANT's pivotal assertion 'that sociology needs to be understood as a science of continuity and symmetry' (Cloatre 2008: 92).

ANT is a means of tracing heterogeneous networks/worknets/fluids/rhizomes and the ways in which they generate or enrol actants. Many of these actants are 'hybrids' (Latour 1993) between human and non-human actors - including 'material and discursive elements' (Cloatre and Dingwall 2012: 42). ANT highlights the ubiquitous nature of the associations between human and non-human entities. For example, 90% of the human body is composed of cells from viruses, parasites, fungi, and bacteria rather than human genomes (Haraway 2008); and when viruses, including influenza viruses, enter the human body and penetrate and take over human cells, they must surely be hybrid cells (which are in themselves actor-networks rather than single entities, constituted of component parts, i.e. a nucleus, mitochondria, etc.). Some commentators refer to this hybridity as our "microbiome" (Hooper and Gordon 2001:115), or to humans as "superorganisms whose metabolism represents an amalgamation of microbial and human attributes" (Gill et al. 2006:1355). Harraway (2008: 330) has noted that microbes, amongst other 'critters', are 'always relationally entangled rather than taxonomically neat'.

Like SARS, in Schillmeier (2008: 180), the H1N1 pandemic influenza virus:

> gained its *agencement social* [original emphasis] precisely because of its mutability: it transgressed the boundaries of its animal origin so much that SARS became a human virus. This meant that the virus still remained a virus, but multiplied its ontological

> status (Morse, 1993). Indeed, such a cross-species transfer changed the reality of the virus.

Where *agencement* is explained by Schillmeier (2008: 192) as:

> perhaps we should follow Callon (2003) and replace the notion of agency by another one like the Deleuzian concept of *agencement* which is explicitly indefinite and means assemblage. While agency refers to the will and action of an individual subject quite systematically, *agencement* reminds us of the intrinsic distributedness and heterogeneity of action as a collective achievement…*Agencement* also allows as distinction between some configurations that enable organisms to speak for themselves…and others that prevent them from demonstrating their competencies or express their preferences. It does not aim at comparing humans and non-humans,…but underline the collective, pluralistic form of agency helping us to switch to a different entity (Barbier and Trepos 2007)

However, the concept of hybridity in ANT goes beyond such material connections. It is a metaphor that underlines the interdependencies between human and non-human actants. Latour (1993) uses the terms 'quasi-objects' and 'quasi-subjects' to signal the continually shifting boundary between human and non-human entities. The notion of hybridity also underlines the ANT position that all actants may also be thought of as actor-networks, depending upon the level of analysis and purposes of the sociologist or of other associated actants. A network in ANT refers both to the lines, that join actants, and the points and actants, which are constituted by the network, but which may also be decomposed to reveal their enrolment in other networks.

An ANT study aims to 'reassemble the social' (Latour 2005), rather than deconstructing it; this is done by 'follow[ing] the actors themselves'[10] (Latour 2005: 11). Tracing actor-networks involves investigating how those actor-networks came into being, or are represented as having come into being; how actors are enrolled into and mobilised in a network; how associations between actors constitute the network; how networks intersect with other networks and become part of extended actor-networks; how networks do or do not achieve durability, or at least temporary stability; and how networks change (are re-ordered and re-configured) over time. In ANT, when a new actant (for example, a novel influenza virus or vaccine) becomes enrolled in, or unenrolled from, a network the entire network is affected. The intersection and enmeshment of networks means that networks are constantly changing, fluid entities.

Developments in Actor-Network Theory

In France, ANT has become known as 'sociology of translation' because, as Latour (2005: 108) explains:

> To designate this thing which is neither one actor among many nor a force behind all the actors transported through some of them but a connection that transports, so to speak, transformations, we use the word translation— the tricky word 'network' being defined...as what is traced by those translations in the scholars' accounts. So, the word 'translation' now takes on a somewhat specialized meaning: a relation that does not transport causality but induces two mediators into coexisting. If some causality appears to be transported in a predictable and routine way, then it's the proof that

[10] Latour (2005: 108) points out that 'the oldest etymology of the word socius: 'someone following someone else', a 'follower', an 'associate''.

> other mediators have been put in place to render such a displacement smooth and predictable...I can now state the aim of this sociology of associations more precisely: there is no society, no social realm, and no social ties, but there exist translations between mediators that may generate traceable associations.

Latour's (2005) reference to 'sociology of associations' is used to distinguish this approach from mainstream sociology, or, as Latour calls it, the 'sociology of the social'. The 'sociology of associations' differs significantly from the 'sociology of the social' in that the former considers that the 'social' is constituted through its interaction with the non-social; whereas the 'sociology of the social' regards the 'social' as itself being constituted *a priori* by the social:

> Thus, social, for ANT, is the name of a type of momentary association which is characterized by the way it gathers together into new shapes (Latour 2005: 64).
>
> This, then, is the crucial analytical move made by actor-network writers: the suggestion that the social is *nothing other than patterned networks of heterogeneous materials* (Law 1992: 381).

ANT is constructivist in that 'neither society nor the social exists in the first place. They have to be traced by subtle changes in non-social resources' (Latour 2005: 36).

The 'sociology of the social' and the 'sociology of associations' also differ in their understanding of the inherent stability of society. The 'sociology of associations' views society as an extended actor-network, inherently unstable and only temporarily stabilised by the work of actants (human, non-human and hybrid); very few actor-networks are permanently stabilised. Moreover, the 'sociology of the social' only recognizes the agency of human actants, at the expense of non-human and hybrid actants. Finally, as Latour (2005: 40) states: 'the sociologists of the social believe in one type of social aggregates, few

mediators, and many intermediaries. For ANT, there is no preferable type of social aggregates, there exist endless number of mediators'.

ANT has developed and diversified considerably since its original conception. However, three basic principles remain intact: generalized agnosticism, generalized symmetry and free association. 'Generalized agnosticism' refers to the impartial stance that an analyst adopts. The distinction between structure and agency, for example, is rendered irrelevant by ANT's view of structure as temporary and contingent in its emergence from action. Power is a consequence and not a driver of action. 'Generalized symmetry' is the principle that a single vocabulary of explanation should be used for all actants, however categorized. 'Free association' identifies ANT's rejection of *a priori* distinctions between the 'social' and the 'natural/technological' (Singleton and Michael 1993).

These three principles give rise to four fundamental methodological precepts. The first is ANT's insistence on empirical, *a posteriori* knowledge*,* rather than *a priori* definitions – a network is defined by its actual members, rather than by its theoretically eligible members. The second is 'relational ontology': actants are what they become within a network rather than being constituted by supposedly fixed and inherent properties. The third is ANT's 'flat ontology', where there are no presuppositions about micro, meso or macro levels of analysis. Actions occur at the local and immediate intersections between networked actors. Finally, the fourth precept is 'translation'. This occurs when key actants – human, non-human or hybrid - associate and become part of a network; or as John Law (1992) says a 'punctualised actor'. This is achieved partly through the introduction of a 'geography of obligatory passage points'. These are, to use the worknet metaphor, holes or nodes in the net through which

actors must travel in order to gain entry. Translation may also be achieved through displacement, where 'enrollers organize and structure the movement of materials, resources and information' (Singleton 1992: 135).

Callon identified four stages of translation: problematisation, interessement, enrolment and mobilisation of allies. *Problematisation* occurs when a problem is defined and a solution is proposed. *Interessement* is the process by which an actant achieves the acceptance of this problem and solution by other actants. This is done by inserting oneself between actants which are already associated in the network; this can only be achieved if the target actants accepts this insertion, temporarily at least. Once interessement has been achieved, *enrolment* defines the key roles and practices in the network. However, enrolment involves more work to be done by actants in the net if it is done across long distances. 'Immutable mobiles' (Latour 1987) can be employed in order to counter this difficulty. These are objects which remain stable on being moved and being combined with other immutable mobiles. Finally, *mobilisation* involves engaging other actants in performing the tasks that attempt to stabilise the network as a solution to the problem. This is not to say that key actants will share common goals. Divergent goals are one factor in the inherent instability of networks. This instability is also due to the dynamic nature of networks, where actants are continuously enrolled and unenrolled, or, as Latour said, go in and out of the 'worknet'. In ANT, actants are either intermediaries or mediators; with the former not achieving any transformation in the network and the latter doing work to transform in the net. Whittle and Spicer (2008) underline the iterative nature of the translation process. Punctualisation, also known as black-boxing or de-

complexification[11] is an important moment in the process of translation. This happens when complex heterogeneous networks are reduced to simple, single actants. Analogies such as a car, a camera and the human body have been used to illustrate punctualisation/blackboxing/decomplexification; it is only when one of the constituent parts of the network stops working in the net that the network again becomes understood as a complex association of heterogeneous actants. For ANT, in fact, there are no single entities; they are all points in networks, whose continued recognition and existence depend on their associations with other actants. As Law (1992: 5) explains, 'Punctualisation is always precarious, it faces resistance and may degenerate into a failing network'. The idea that networks can fail has, however, been challenged by other authors as involving *a priori* judgements that are inconsistent with ANT's basic stance: rather than failing, networks might simply transform or sustain co-existing realities. This issue is relevant to the present study and I shall return to it later in this chapter when I discuss the models offered by previous empirical work using an ANT approach.

Critiques of Actor-Network Theory

There are three main criticisms of ANT: its ascription of agency to non-human and hybrid actants; the indeterminacy of its networks; and, its ethical disengagement. One of the most controversial ideas in ANT is the agency given to non-human and hybrid actants. Lee and Brown (1994) have proposed that this could lead to the creation of a grand narrative, which is something that ANT seeks to avoid. Law (1992) defends the theoretical symmetry between human and non-human actants by arguing that this is an analytical rather than an ethical

[11] These terms are used interchangeably in this thesis. Their opposites are de-punctualization, unblackboxing and complexification. Again, these are used interchangeably.

stance. However, Prout (1996) criticises this defence for its use of the fact-value dualism. This is problematic for ANT which eschews such dualisms. Prout (1996) also suggests this defence leads to the reinstatement of a 'value-free sociology', which I shall return to below. Prout (1996: 151), however, also goes on to provide a solution to this critique:

> what ANT is proposing is that no a priori assumption should be made that human agency is necessarily more important in the constitution of social relations. It is this (rather than a fact-value dualism) that constitutes the theoretical symmetry between entities. Such a position does not entail the view that all entities are identical.

Also, the notion of punctualization or black-boxing implies that human agency may actually be embedded in non-human or hybrid actants. At another level of analysis, these may be decomposed as actor-networks in their own right. This, for example, is at the centre of Cloatre's (2014) discussion of how regulation travels with pharmaceuticals from Europe to Djibouti. The investigation of the agency of material objects is also a useful reminder of the ways in which environments can constrain action, and distinguishes ANT from radical social constructionism:

> there is no easy cohabitation of actor-network theory with social constructionism, or with the strong programme in the sociology of scientific knowledge (SSK). Indeed, just as various moral philosophers have attempted to afford moral rights to animals, so it seems that Callon and Latour are intent on granting sociological, or more accurately, narrative, rights to objects, both 'natural' and 'technological (Singleton and Michael 1993: 227-8).

This stance, for example, allows ANT to absorb the findings of disability studies about the extent to which disability is not exclusively a property of individuals but is generated by the design of physical environments in ways that assume certain capacities in the humans acting

within them (Amundson 1992). Human action always occurs within an environment of non-human and hybrid actants that structures the means available and the possible outcomes.

Strathern (1996: 522) has argued that the network metaphor has `properties of autolimitlessness; that it is a concept which works indigenously as a metaphor for the endless extension and intermeshing of phenomena'. The same criticism could be applied to most of the alternative metaphors offered by Latour and his colleagues, discussed earlier. It is certainly correct to note that the exploration of networks is a potentially infinite task, particularly when we understand that each point in a network is likely to be the summation of a network in its own right. However, this criticism might be applied to most scientific endeavours, with the search for explanations theoretically moving from high-level systems to atomic particles. This does not, though, prevent analysts coming up with pragmatic solutions that decompose the entities being studied sufficiently to achieve a particular analytic objective without becoming locked into an infinite regress. What is important here is that we recognize that our boundaries are pragmatic, contestable and constituted by the same kinds of work that sociologists study in others. Boundary work is also a practical matter for actants in the networks we are studying.

Finally, ANT has also been criticised for its emphasis on description rather than critique. This is not an uncommon charge against the whole family of ethnographic approaches to sociology and tends to reflect quite different understandings of the nature and purposes of the discipline. Certainly, ANT's flat ontology and refusal to ascribe a prior or preferential status to any element of a network also extends to a reluctance to make ethical or moral judgements about the actants and their relations. As I noted at the beginning, the first question in ANT is

'what is going on here' and the sociologist is encouraged to focus on description rather than evaluation. However, an approach that traces networks and gives equal voice to all actants may also highlight unexpected areas for critical appraisal and intervention. In a conference presentation, for example, O'Cuinn (2013) described how his use of ANT had identified unexpected points for legal actions against the governments of Bahrain and Israel over breaches of human rights. He had identified spaces for the interessement and enrolment of new semiotic actants from international law. This had, for example, compelled the Irish travel industry to produce brochures that disclosed the extent to which holidays in 'Israel' were actually spent in illegally occupied 'Palestinian' territories. The point may be more that ANT insists that rigorous and impartial description must be the first obligation of the sociologist. This establishes a better informed basis for ethical or moral critiques or policy interventions, which derive from a quite different starting position.

Previous Studies Using Actor-Network Theory

ANT has evolved in many directions since it was first developed (for example, Mol 1998, Singleton and Michael 1993, and Latour 2002, 2013[12]). Indeed, it has been proposed that ANT cannot be described in a stable fashion because it is re-assembled each time it is enrolled in a novel network; this includes each new research project. It is certainly uncommon for ANT studies to stick strictly to the original tenets. Those that do have been subject to much debate (Doolin and Lowe 2002; Doolin and McLeod 2005; Kaghan and Bowker 2001). Nevertheless, some commentators continue to call for purist ANT studies (Cordella and Shaikh 2006).

[12] Even Bruno Latour, one of the founders, has moved on, to studying 'Modes of Existence'.

An ANT approach has, then, been used by many studies in many different ways since its conception almost 30 years ago. It is not possible to provide a comprehensive review of such a large body of literature here. I shall confine myself to noting the studies that are most relevant to this thesis, particularly those addressing technological innovation (given the annually novel nature of influenza vaccines) and preventive health measures (given that this is what vaccinations are).

Robert et al. (2010: 248) state that:

> The contributions of this theoretical perspective to the study of technological innovation are: firstly, as a mapping tool to describe the multiple interacting 'actors' and influence in a complex case study; secondly, to help consider why innovations appear to 'behave' differently in different settings or at different times and; thirdly, to draw attention to the unintended consequences of innovation adoption and assimilation (as well as the anticipated ones).

These elements are reflected in a number of studies that have influenced the present adoption of an ANT approach to investigate a preventive health programme for influenza within the contest of health services research: Cresswell (2011) explored the adoption and implementation of electronic health records and Singleton (1992) examined the cervical screening programme. Recognizing that innovation need not be purely material or technological, Cloatre (2008, 2014) investigated the impact of semiotic innovations in intellectual property law on the supply of pharmaceuticals in Djibouti and O'Cuinn (2013) traced the developments in English administrative and PH law prompted by the emerging recognition of influenza viruses since 1889.

With a few notable exceptions (e.g. Law 2000; Novek 2002; Star 1991), ANT studies have generally considered successful networks rather than 'failures'. As we have seen, the notion of 'failure' is a difficult one in ANT. However, Novek's (2002) work on the rejection of an attempt to introduce an automated drug distribution system into routine practice in a Canadian healthcare facility has been helpful. An ANT approach revealed how the technology, particularly in the way that it black-boxed a set of strict rules and procedures, did not enrol the nurses and pharmacists expected to use it because of its resistance to the competing requirements of the other networks in which they were engaged. This can be contrasted with de Laet and Mol's (2000) study of the "Zimbabwean Bush Pump". Here, a technology designed for an African village successfully adapted to local requirements and generated a stable network of usage, integrated with the users' other networks. As Prout (1996:203) observed, from a study of the metered dose inhaler (MDI), ANT makes theoretically explicit 'the implicit recognition that [technologies]...are participants in the social interaction' (Prout 1996: 203).

The value of such analyses is underlined by Cresswell (2011: 67-71):

> health services research...may benefit from being informed by Actor-Network Theory perspectives... [they are] conceptually useful in helping to appreciate the complexity of reality (including the complexity of organisations) and the active role of technology in this context...This can then result in recommendations of how to make the new network...more stable and in so doing facilitate the effective integration of the technology into the healthcare environment.

While ANT is fundamentally a descriptive approach to the social worlds that it studies, the results may be adopted to inform policy and practice and to smooth the processes of translation and stabilization. Although constantly vulnerable to network effects, the findings

and theoretical understanding are available to identify points of action and potentially useful actants, and to develop plans of action.

Why Actor-Network Theory?

> As different human actors interact with a device the alliances they form become contested, precarious, shifting and treacherous. A device is, therefore, never simply inserted or diffused into a setting but is always subject to these processes of translation during which humans interact with it, each configuring and reconfiguring the other in unpredictable and often unexpected ways (Prout 1996: 202).

HCWs are not passive recipients of influenza vaccines. They have a complex relationship with this technology, and with influenza viruses. Influenza immunisation is inserted into pre-existing networks within which HCWs have been enrolled, through connections structured by life history, social status, culture, gender, ethnicity, education and profession. These networks are both disrupted by this new actant and challenged to accommodate to it, or to resist and expel it. ANT analyses 'the co-evolution of society, technological artefacts and knowledge of nature (Callon 1986b)' (Singleton 1992: 132).

The influenza vaccine is inserted into HCW networks in response to an elusive and unstable object, the influenza virus, that itself seeks to engage with the same networks with disruptive consequences. The vaccine is part of an attempt to stabilize these networks in advance of such a challenge – but is itself unstable since the protean nature of the virus means that no vaccine can be assumed to be an exactly matched barrier to network entry. ANT accepts this instability but notes that it is both biological and social – immunisation not only protects the

individuals who receive it but the networks in which they are enrolled and from which they potentially disengage during episodes of illness: 'Infectious diseases are not produced by biological pathogens alone but also by political, social, cultural and economic pathogens' (Das, Das and Coutinho 2000: 630).

One of Latour's first studies considered the laboratory work of Louis Pasteur in introducing a new hybrid actant, the microbe, into society: 'in his very scientific work, in the depth of his laboratory, Pasteur actively modifies the society of his time and he does so directly - not indirectly - by displacing some of its most important actors' (Latour 1988a: 156). Microbiology was not just about microbes: it was also about, for example, the networks that had become stabilized around miasmatic theories of disease and the economic and symbolic rewards that had associated with them. A similar ANT analysis would reveal how a new actant, the virus, did not successfully enrol a network of medical technology until 1931:

> a virus-any virus-is a constructed entity, a representation, whose legitimacy is established and legitimised through a whole series of operations and representations, all highly stylised. Each of these must be critically analysed on its own terms rather than accepted as though a scientific assertion about a virus stood for a referent rather than a sign (Treichler 1992: 75).

ANT reveals that Influenza is not only a protean clinical entity but it is also a multiple, fluid social entity. Although the influenza virus had been seeking recognition since at least 1889, it had been unable to make itself visible until the assembly of another actor network, generated by the electron microscope. O'Cuinn (2013: 86) has shown how this failure, by comparison with the visibility of bacteria, had profound consequences for PH law and

governance that compromised responses to the 1918 influenza pandemic: 'Even the epidemiological act of attributing deaths and illness to a microbe [i.e. an influenza virus] is dependent on a complex set of process, medical, legal and even cultural practices (Law and Urry 2004)'.

It was only in 1933 that the specific human influenza virus achieved visibility, and made it possible, in 1936, for the first human influenza vaccine to appear (Francis and Magill 1937). As with Latour's (1988) study of Pasteur and the anthrax bacillus, the influenza virus, the electron microscope and human actors were 'engaged in a process of… becoming visible in the laboratory' (Galvin 2011: 125), or, as Latour (1999: 124) later said, they 'mutually exchange and enhance their properties'. The influenza vaccine was co-constructed by scientists and influenza viruses working together to create a novel hybrid actant 'Scientist-and-the-influenza-virus'. An influenza vaccine is actually a virus (whether live attenuated or inactivated) that is being inserted; sometimes along with adjuvants. Influenza viruses achieve their insertion into vaccines through the work of mediating pharmaceutical actants who re-assemble and transform the influenza virus from a high-risk microbe into a lower risk one. It is important to note that when an influenza vaccine is inserted into a body, it is, at least in part, an influenza virus (whether live attenuated or inactivated) that is actually being inserted. As with Gramaglia's and da Silva's (2012: 188) *Corbiucla*, the fact that the virus is attenuated or killed by human actants 'does not diminish their contribution to action. Their sacrifice may also be considered as work'[13]. Influenza viruses, along with other non-human and hybrid

[13] Gramaglia and da Silva (2012: 188) note that, 'There has been a long debate about accepting (or refusing) the word "sacrifice" to describe the death of lab animals (Lynch 1988, Remy 2006)'; this would be even more controversial for microbes, such as viruses.

actants (i.e. chicken eggs or cell culture, and sometimes adjuvants), are re-assembled into vaccines through the co-production/construction by human, non-human and hybrid actants (i.e. vaccinologists, viruses and technology, respectively). This re-assemblage transforms the influenza virus from a high-risk microbe into a lower risk one. I do not say 'no-risk vaccine' because the influenza virus also pushes back against this transformation in the form of off-target or side- effects, some of them more serious than the risk of the wild disease:

> Technologies of medicine and drugs are developed and designed to restore or to empower human agency; at the same time, however, they improve the agential power of natural substances, microbes or other transformed entities…sometimes they turn into "unruly technology" (Wynne 1988), showing unanticipated deviations from routine operations, which raise questions of human and machine agency…'agents may be [vaccines that are] produced with the intention of endowing them with the capacity to execute actions in the name of another [i.e. confer immunity without associated infection] – for instance, a human agent. Tasks are delegated to such agents, but here too they are free as to how they get the task done' (Rammert 2012: 97).

So while influenza vaccines target potential vaccinees, when influenza vaccines enter the vaccinees' bodies, their flow can be lacking in direction.

Therefore, influenza vaccines are 'embodied in and performed by an endless network of heterogeneous materials, human (for example, patients/clients, clinicians, and scientists) and non-human [for example, adjuvants, needles, vials, syringes and fridges]' (Moser and Law in Law and Hassard 1999: 214). They are complex, hybrid associations of social, human, natural and technical elements in fluid actor-networks, packaged as medical devices: 'The

pharmaceutical chemical is inserted into the social process that constitutes it as a drug' (Dingwall and Wilson 1995: 122).

ANT offers another approach to understanding influenza viruses and vaccines, where these entities are not only acted upon but also push back against other actors in the net. For example, when a vaccine has been inserted into a person the human actor cannot stop the vaccine creating an immune response in the body. Abraham's (2002: 319) comments on drugs apply equally to vaccines:

> drugs have chemical properties which can be at times determinant irrespective of human agency…No amount of mental effort will be able to prevent this partly predictable biochemical interaction between the drug and my body. Thus, non-human entities are essentially independent of human agency in this (and many other respects).

Therefore, like Donaldson, Lowe and Ward's (2002: 207) foot-and-mouth disease network, influenza viruses and vaccine networks display 'a high degree of irreversibility, the vaccine cannot remove the virus if it is already present' and the vaccine cannot be removed if it has already travelled into the vaccinee.

It took another twenty years for the physical structure of viruses, including the role of DNA and RNA, to begin to make itself understood by biomedical science. By 2005 the 'Spanish influenza' virus of 1918-19 had been reassembled. When associated with the retrospective analysis of blood from survivors of the 1889 pandemic, where the virus also made itself recognized (Magill and Francis 1936), the virus was now able to construct a social history for

itself, which became an important driver for the policy measures discussed in the previous chapter.

As noted above, one of the potential problems for ANT is the potentially infinite expansion of the network, both horizontally and vertically, in terms of the spread of actants involved and the decomposition of punctualized actants into their constitutive actor-networks. This study, then, has necessarily taken a number of pragmatic decisions to black box various elements of its investigation. The influenza virus's journey to visibility, and its role in the co-production of the vaccine, will not be examined.[14] The work of the pharmaceutical industry in research, development and production of vaccines will also be left to one side.[15] My focus will be on the vaccine's journey from the factory gate into the bodies of HCWs. Influenza vaccines achieve this by building a network and set of passage points as they travel by mobilizing heterogeneous mediators. These would include actants like policy guidance documents, statements of ethical values for HCWs and promotional tools like posters or emails, as well as vaccinators, regulators or service managers. This network is, however, only one engagement for the HCWs and must continuously compete with others. OH professionals, for example, become different kinds of actants in the HCW influenza immunisation network from other networks in which they are enrolled. Vaccinated HCWs are hybrid actor-networks of human cells and influenza vaccines. During an outbreak, epidemic or pandemic of influenza, their hybrid status will allow them to perform their roles within the worknet when the unvaccinated may be unable to do so.

[14] For good accounts of the 1918-19 influenza pandemic and the co-evolution of science see Barry (2004) and for the development of vaccines see Rhodes (2013).

[15] However, Chapter Four does briefly consider the work of pharmaceutical companies.

As an ANT analysis, this study argues that the HCW influenza immunisation programme is a durable actor-network, despite (or maybe because of) the inherent instability of associations between actants in the network (including those between HCWs, influenza viruses and influenza vaccines). The following chapters will show that the durability of the network is a result of the sustained work done by human, non-human and hybrid actants in the net, including influenza viruses whose action is essential in maintaining the network.

Having introduced ANT, I am now equipped to present the reframed research question which are informed by the ANT approach and employ ANT infralanguage:

Actor-Network Theory Informed Research Questions

What is the HCW influenza immunisation programme network in Wales?

How are actants enrolled into, or unenrolled from, and mobilised in this network?

What are the associations between actants present within this network?

How does this network intersect with other networks and become part of extended actor-networks?

Has this network achieved durability, or at least temporary stability? And if not, why?

How has this network changed over time, particularly in light of the H1N1 influenza pandemic of 2009-10?

Conclusion

This chapter has considered ANT as a theoretical framework, methodology and set of sensibilities. The theory, coming from STS, has challenged the 'sociology of the social' and has provided a conceptualisation of the 'sociology of associations' where actants (this term encompasses human, non-human and hybrid actors) do work in actor-net(work)s in order to temporarily stabilise these networks. The ontological consequences of this theory are not without controversy and are still debated. Likewise, ANT as a methodology has also been critiqued. Despite such divided opinion, ANT has been widely employed and developed as both a theoretical framework and methodology for nearly thirty years. The main tenets and benefits of such an approach have been outlined, and the relevance to this study have been considered.

Now that all the research objectives, aim and questions have been presented, the next stage is to describe how these will be answered. ANT resists grand theorising and instead focuses on the empirical. The next chapter outlines the methods that I used in order to generate this empirical data. The effect of taking an ANT as an approach and set of sensibilities to data generation, sampling and analysis will be investigated.

Chapter Three

Methods

Introduction

This chapter describes the methods that I used in this study. I begin by outlining my ontological and epistemological positions as a researcher, as this influences how researchers choose to generate and analyse data. The very fact that I use the term data generation, rather than data collection, is in itself an important consideration [16]. My ontological and epistemological positions and methods are, of course, informed by the theoretical framework and methodology that I have chosen to employ, actor-network theory (ANT). This issue will be discussed before considering the fieldwork itself, which includes sampling decisions, data generation, transcription and analysis. Ethical issues are considered throughout the chapter and a separate reflexive account is also provided at the end.

Actor-Network Theory and Qualitative Research Methods

The previous chapter outlined the theoretical framework and methodological approach, actor-network theory (ANT), for constructing an actor-network account, which emphasises the symmetry of human, non-human and hybrid actants. Despite this symmetry and wishing to 'follow the actants' in this network, non-human/hybrid actants (for example, influenza viruses and vaccines) may not be able to speak for themselves as such. Influenza viruses and vaccines are visible in the laboratory through the use of electron microscopes and PCR, but

[16] This is considered further in this chapter.

their action in the world outside the laboratory is only visible through the effects that they have on other actants. Thus the data generated, by the research methods employed in this study, are given by human (informants) and hybrid (documentary) actants.

This study follows the example of Langdridge and Flowers (2013: 832) in their analysis of another viral actant, HIV, in that:

> No a priori assumptions are made about the importance of particular entities, whether human, viral or medico-technical, accepting that the primary source of data in this study is a human account. This account is not privileged for offering insight into a particular human psyche but instead is understood to provide the most readily accessible and pertinent route into an understanding of the assembly of relations concerning the meaning and potential involved in living...with a viral-*Other*.

Methodology, research questions and practical aspects are mutually influencing (Carter and Little 2007). As I want to explore the ways that health professionals thought about and understood the HCW influenza immunisation programme, I believe that qualitative methods are the appropriate way to approach the research. This qualitative approach means that I can focus at a 'local level' to explore the accounts of the reasons for health professionals' uptake of influenza vaccines. This produces a fine-grained analysis that explores the complexities and subtleties of the HCWs' accounts of the reasons for their compliance and/or non-compliance.

The data generation and analytical approach in this study 'were informed by a sociotechnical Actor-Network Theory-based approach highlighting the interrelated nature of [biological, political, moral] technical and social dimensions' (Cresswell, Worth and Sheik 2011: ii). For ANT studies, the primary methods of data generation are qualitative. I decided to use a multi qualitative method approach (i.e. ethnography and policy analysis) because 'Widening the scope of analysis can help us ascertain how multiple obligatory passage points co-exist in an actor-network to coproduce translation by collaboratively enriching goals' (Bliss 2013: 2).

I chose individual semi-structured depth interviews, focus group discussions and document analysis as the most suitable qualitative methods within the context of this research. It was necessary to create these interview and focus group situations because the issue of uptake and non-uptake of seasonal and pandemic influenza vaccines before the 2010-11 winter influenza season was not amenable to me through observational methods, having begun this study post-pandemic. It was a practical decision not to conduct observations during the 2011-12 and 2012-13 winter influenza seasons. This decision was reinforced by not being able to compare observations with those from the pandemic and pre-pandemic immunisation programmes. Although I did 'hang out' in the research sites (Dingwall 1997).

Ontology and epistemology have been defined as 'claims or assumptions that a particular approach to social enquiry makes about the nature of social reality' and 'assumptions about knowledge and how it can be obtained' (Blakie 1993: 13), respectively. These ontological and epistemological positions of a researcher affect how that researcher chooses

to generate and analyse data. Ontologically, I believe that informants (i.e. the participants in the research) and I (i.e. as the researcher) generate the data together (i.e. audio recordings) in the research encounters (i.e. qualitative interviews or focus group discussions). I take the position that the data does not exist, waiting to be collected, prior to the research encounter; and the emergent nature of data was quite obvious to me in research encounters where informants stated that for many of the questions that I asked they did not hold a pre-existing position or answer, to be collected by me.

For the data that I generated with the informants, I take a critical and interpretative stance to the accounts that resulted. These interpretations are mine alone and as such I did not seek respondent validation. As Bloor (1997) highlighted, there are several issues around such validation, including political, ideological and practical concerns, and around the comprehensibility and acceptability of the research. That said, I take a (critical) realist stance to the extent that as an ANT study I seek to follow the actants and let them speak for themselves (including the human informants)[17]; this is achieved by the inclusion of data artefacts (i.e. transcript extracts) in the empirical chapters. However, it is my assertion that, it is my interpretation of the data extracts that I am presenting in this thesis, rather than any unmediated access to the actants' accounts, despite ANT's claims to the contrary. Furthermore, I am not claiming that the data extracts reflect the reality of the HCW influenza immunisation actor-network in Wales between 2009 and 2013. Epistemologically, I hold an interpretivist view, where each individual has its own reality and these realities are subjective. Moreover, informants may have their own reasons for producing particular accounts and

[17] Taking into account the difficulties already mentioned at the start of this chapter of doing this with actants other than the human informants in this study.

making claims about themselves and others in the network. One such reason is social desirability, another is to advance their own position or disparage that of others. As a result, the accounts are as much a reflection of the individual informants themselves, as they are of the network as a whole.

Studies into childhood vaccination uptake (Heggenhoughen and Clements 1987; New and Senior 1991; Rogers and Pilgrim 1995; Marshall and Swerrisen 1999; Telford and Rogers 2003) have elucidated the value of qualitative methods for 'exploring in-depth peoples' understanding of the cause of illness, and the subjective assessment of the risks and benefits of the immunization for vaccine uptake' (Telford and Rogers 2003: 744). In particular 'focus groups [as opposed to qualitative interviews] can challenge the assumption that 'attitudes' and 'risks' are objects whose basic meanings are stable and universally accepted' (Waterton and Wynne, 1999: 127). This is particularly important in an ANT study, where the instability of social objects, including attitudes, risks and values is illuminated. Furthermore, qualitative methods can assist in producing policy relevant insights, by: 'avoid[ing] imposing our own structures and assumptions upon informants' views of the world (Britten 1995). Quantitative interviews may run a serious risk of misleading policy and practice by failing to uncover the range and depth of people's feelings and opinions (Pill 1995)' (Murphy and Dingwall 2003: 83).

Focus group discussions have been widely used to complement qualitative interviews and 'deepen the earlier analysis' (Bloor et al. 2001:18), provided by qualitative interviews, by

challenging 'how such data are interpreted' (Barbour and Kitzinger, 1999: 7), in investigations of non-uptake of healthcare services (Barbour 2007), including studies around immunisation (Evans et al. 2001). This is due to focus groups' 'capacity to explore such elusive 'Why not …?' –type questions' (Barbour 2007: 24).

I use the term focus group discussion to distinguish the method from group interviews (where each participant is asked each question in turn, rather than it being a more unstructured discussion) and other commercially run non-academic focus groups. Bloor et al. (2001: 42-3) propose that:

> In focus groups, pre-determined questions may also be asked, but the objective is not primarily to elicit the group's answers but rather to stimulate discussion and thereby understand (through subsequent analysis) the meanings and norms which underlie those group answers. In group interviews the interviewer seeks answers, in focus groups the facilitator seeks group interaction...The focus group facilitator's questions are thus a 'focusing exercise', an attempt to focus the group's attention and interaction on a particular topic.

I would assert, however, that the substantive issues discussed in the focus groups' are also important and should not be ignored in order to solely focus on group interaction.

Focus groups have been described as 'Located midway between observational fieldwork and one-to-one interviews...involving 'structured eavesdropping' (Powney 1988)' (Barbour 2007: 35). It has also been argued that focus groups are the preferred method when studying group

norms, meanings and processes (Bloor et al. 2001) and decision-making processes; particularly where these norms are unarticulated and implicit, decisions appear illogical (Barbour 2007) or misconceptions arise (Halloran and Grimes 1995). This is particularly true where pre-existing groups are used:

> Kitzinger argues, by utilizing friendship groups the researcher may be able to tap into interaction which approximates to 'naturally occurring' data (such as may be collected by participant observation). She notes 'Above all it is useful to work with pre-existing groups because they provide one of the social contexts within which ideas are formed and decisions made' (Kitzinger 1994: 105) (Bloor et al. 2001: 22).

In addition, to the data generated in the interviews and focus groups, documents germane to the immunisation programme were also analysed as actants in the network. These included legislation, policy guidance documents, statements of recommendations, government reports and pandemic plans.

Despite the advantages afforded by qualitative methods, drawbacks of such methods have also been identified, particularly concerning qualitative interviews (rather than focus group discussions and observational methods): 'The data produced by interviews are social constructs, created by the self- presentation of the respondent and whatever interactional cues have been given off by the interviewer about the acceptability or otherwise of the accounts being presented (Dingwall 1997: 59). Furthermore, ANT authors have emphasised the unavoidably performative nature of research methods (for example, Law and Urry 2002)

and the problem that this poses for the need 'to maintain a rigorous and scientific approach to empirical research' (Cloatre 2008: 124).

As I stated in the introduction to this chapter, I use the term data generation rather than data collection when describing the methods I used. I, therefore, acknowledge the socially generated/constructed and performative nature of the interviews, and focus group discussions, used in this study. I would also argue, however, that quantitative methods, for example surveys, and that another qualitative method, overt observation, also generate rather than collect data. I propose that as long as researchers acknowledge, reflect on and incorporate the socially constructed nature of their data into their analysis then these methods are valid tools to use.

Qualitative methods have also been criticised for being concerned with individuals. As an ANT qualitative study, however, which makes reference to ANT as a theoretical approach and uses concepts developed in ANT, it is idiographic but gives a generalised understanding, rather than a full description of this actor-network (which is potentially infinite), and uses a top-down logic (the basis of which is provided by ANT's theory of society).

My findings are also limited to the extent that, as a qualitative study, the data, and data artefacts, are based on self-reported accounts and they may not be statistically representative of all HCWs or empirically generalizable to other hospitals and/or healthcare organisations. Instead, analytic generalizability, that is, 'how far we can draw conclusions

from interviews [or focus groups] to other people or other situations' (Flick 2007: 81) and external generalization which 'depends on how the variety of groups was constructed: the greater diversity of the groups and in the groups' (Flick 2007: 86) are the goals. Furthermore, since the methods used in this study are qualitative, reliability and validity are not relevant issues. Instead, credibility, transferability, dependability and confirmability are the concerns in this thesis (Bryman, 2001). Credibility is presented by having more than one example of each claim made where possible. Transferability is given in the quotes from interviews and focus groups, and in the documents that have been examined. This is aided by 'Making use of the comparative potential of datasets' (Barbour 2007: 148). Dependability is provided by looking for similar themes in utterances around other vaccines and other diseases. Confirmability is possible by reading the quotes and documents that were analysed in this study; the latter of which are easily accessible.

Sampling and Fieldwork

Sampling decisions are important in qualitative research even though statistical representativeness is not required in such studies. Qualitative 'purposive' (Kuzel 1992) sampling, should 'reflect the diversity within the group or population under study' (Kuzel 1992; Mays and Pope 1995) and informs the comparisons that you can make with your data (Barbour 2007).

An ANT-informed approach allowed me to sample theoretically, by focussing on informants that are particularly interesting actants in the network for this study. This is practically very

useful since the number of actants in a network is potentially infinite. The 2009-10 pandemic itself was an important actant in this theoretical sampling:

> For the social scientist, epidemics constitute an extraordinarily useful sampling device - at once found objects and natural experiments capable of illuminating fundamental patterns of social value and institutional practice. Epidemics constitute a transverse section through society, reflecting in that cross-sectional perspective a particular configuration of institutional forms and cultural assumptions (Rosenberg 1989: 2).

This theoretical sampling was in turn informed by the research questions outlined in chapters one and two, and by the practical constraints of the study (Miettinen 1999; Law and Hassard 1999), which are elaborated on later in this chapter. Conceptually, it was useful to remember that the UK HCW influenza immunisation programme extended actor-network consists of multiple smaller networks (for example, the four devolved nations, healthcare organisations, institutions, departments and professions) (Cresswell, Worth and Sheik 2010). This ANT approach then allowed me to 'examine how these different networks align or fail to align (e.g. across different wards) and how they are positioned in relation to each other and larger networks (e.g. the hospital, the historical, cultural, political environment) [Singleton and Michael 1993]' (Cresswell, Worth and Sheik 2010: 74).

I elected to consider the HCW influenza immunisation programme in one extended actor-network, i.e. one of the four devolved UK national health services, rather than in the UK as a whole because the differences in the four national health services may have acted as confounding variables in the study. Rather than considering differences in the four UK

national health services I wanted to focus on differences between hospitals within a single health service. Although Chapter Four, in particular, does consider the differences in the Welsh and English programmes.

I chose to conduct my fieldwork in NHS Wales, partly for my own convenience, as I live in Wales, but also because the smaller healthcare network than England facilitated close examination. It also had the added sociological interest that Wales has a lower average HCW influenza vaccine uptake than England, Scotland and Northern Ireland. I decided to conduct a multi-sited (i.e. two sited) study as this would enable me to:

> gain an insight into both local contexts and the wider social system in which these are situated [Marcus 1995; Hannerz 2003]. These local contexts (or sites) are, although different, to some extent assumed to be related and purposefully chosen, which fits in well with Latour's concept of associations [Marcus 1995; Hannerz 2003; Nadai and Maeder 2005]. It is thus important to examine connections, impacts and local differences over time in the face of some common phenomenon [Marcus 1995; Hine 2007] (Cresswell, Worth and Sheik 2010: 71).

The strategy that I used for case selection was information-oriented selection with two extreme/deviant cases (Flyberg 2006). This strategy was appropriate because:

> When the objective is to achieve the greatest possible amount of information on a given problem or phenomenon, a representative case or a random sample may not be the most appropriate strategy. This is because the typical or average case is often not the richest in information. Atypical or extreme cases often reveal more information

> because they activate more actors and more basic mechanisms in the situation studied (Flyvberg 2006: 229).

While I am considering two Welsh LHBs, the main narrative of the thesis is not a systematic comparison of the two case studies (nor of individual HCWs) because they are not directly comparable; for example, I did not interview comparable informants in the two LHBs. Instead, what I am providing is a description of the Welsh HCW influenza immunisation programme as a whole, with two extreme cases providing some insight into the range of parallel experiences within the network at particular times, i.e. during the pandemic and the following post-pandemic season. Indeed, it is often the stories of particular, departments, professions or individuals which are more important than which LHB they belong to.

The two LHBs were selected by looking at the LHB uptake of seasonal and pandemic influenza vaccines by frontline HCWs during the 2009-10 pandemic and the 2010-11 post-pandemic influenza seasons. Like Yassi et al. (2010), sites were chosen due to high and low uptake figures. One LHB, LHB B, had a higher than Wales average uptake for pandemic influenza vaccine during 2009-10 and a lower than Wales average for seasonal influenza vaccine during the 2009-10 and 2010-11 seasons. Two LHBs had a lower than Wales average uptake for pandemic influenza vaccine during 2009-10 but a higher than average uptake for seasonal influenza vaccines during the 2009-10 and 2010-11 seasons. Of these two LHBs with the same immunisation profile, LHB A was chosen due to its closer similarity to LHB B, in terms of size, case mix and urbanicity. The LHBs' vaccine uptakes are proxy measures for the two hospitals that were chosen to undertake the fieldwork in. The hospitals were chosen, again due to their similarities in size, case mix and urbanicity. I decided not to use pseudonyms for the LHBs

chosen because I have always thought of them as LHB A and LHB B. LHB A was so called because it was the LHB that I started the data generation in first, due to receiving R&D approval from this LHB before the other one.

I decided to generate data with health professionals (i.e. doctors, nurses and midwives) working in three different departments within those hospitals. I chose the Emergency Departments (EDs) because HCWs in working in EDs are particularly at risk of being infected with influenza, being the frontline of the hospital. In addition, I elected to look at paediatric and obstetric departments because I thought that they would be interesting environments to study, particularly given the burden of H1N1 pandemic influenza suffered by children and pregnant women in the 2009-10 pandemic[18]. Furthermore, their patients/clients are vulnerable to serious seasonal influenza infection as some other patient groups, such as those in intensive care units (ICUs) and older people, but this may not be as well known to HCWs.

Public Health Wales (PHW) provided the immunisation uptake figures[19] and were named as collaborators on the ethical application. Collaborators in PHW made the first approach to the Directors of OH in the two LHBs. In turn, the OH Directors sought verbal agreement for the study from the Directors of Medicine, Nursing and Midwifery and the Clinical Directors of the

[18] My doctoral supervisors suggested that I could investigate intensive care units, but given that Intensive Care HCWs already have high uptake of influenza vaccines due to the known serious effects of influenza in intensive care units and the vulnerability of intensive care patients to infection, including influenza, I decided not to choose this setting. During the data generation stage of the study key informants reported that HCW influenza immunisation is 'in actu' mandatory in intensive care units. As a result, these departments would have been more interesting to study than I originally thought.

[19] Although this did take longer than had been anticipated and resulted in a knock on effect of pushing back the start of data generation as the ethical application could not be progressed until I knew which LHBs/Trusts I was going to study. This compared unfavourably with a region of England where the figures were available much sooner. This has continued to be the trend as the figures have been updated yearly while undertaking this study. The role of these numerical actants are considered in more detail later in the thesis, particularly in Chapters Five and Eight.

Emergency, Obstetric and Paediatric Departments at the LHBs. The OH Directors were also named as collaborators on the ethical application and in one LHB I also had to name the Clinical Directors of the three departments on the R&D application. Organising the collection of information and signatures from all the collaborators for the ethical and R&D application proved to be a time consuming and difficult task. At the time that the application was being prepared, the NHS ethical approval process was changed, which allowed me to send our application to a proportionate review ethics committee because I was only doing research with NHS staff and not with patients. The North East Wales Research Ethics Committee (Central and East) granted ethical approval[20] for the study and the two health boards gave R&D approval for the studies to be conducted on their premises.

I adopted a situational relativist position to ethical decision making (Plummer 2001; Vivat 2002). For example, my institution insists that consent forms[21] state that participants are unable to withdraw statements that are given in interviews/focus groups. However, on two occasions I was asked, and agreed, not to transcribe sections of interviews which were about the personal life of the participant and a distressing event that had happened to an informant's colleague.

The OH Directors also recruited the Directors of Medicine, Nursing and Midwifery in the LHBs as key informants (KIs). The first OH Director that I interviewed informed me that most of the planning, delivery and organisation of the HCW influenza immunisation programme was in

[20] REC reference 11/WA/0278
[21] See Appendix B for consent form.

fact done by OH nurses. I therefore decided to recruit, through the OH Directors, the two OH nurse managers as KIs. In addition, I also interviewed as a KI an Emergency Planner at one LHB, after it emerged in another KI interview that they have been mobilised in planning and delivering the immunisation programme beginning with the 2009-10 pandemic. For the most part, the recruitment of KIs was unproblematic; apart from one Clinical Director, who I had to persuade that they were the appropriate person to be interviewed.

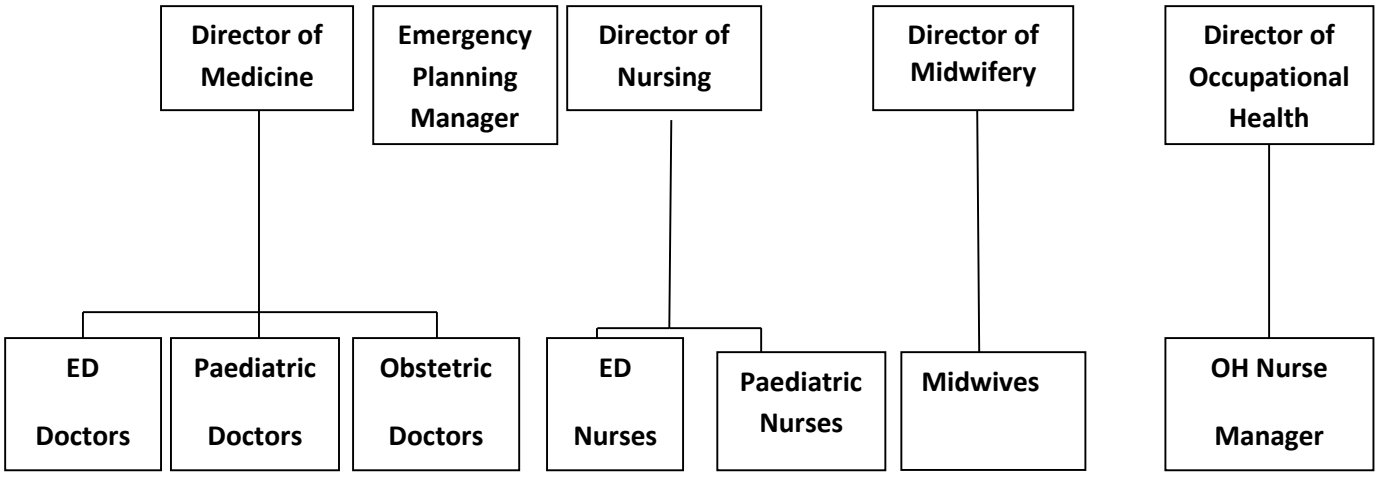
Recruitment of non-KIs was not as straightforward. At LHB A, I initially tried to recruit non-KIs through a letter from the OH Director. Of 24 letters that were sent out, only two positive responses were received, from two midwives. These two informants then recruited two more midwives; three of which took part in the first focus group and one, who was called away before the start of the focus group to work, took part in an individual interview a couple of days later. I then decided to try recruiting informants using posters[22] displayed in the three departments and through the OH Directors contacting the departments directly. The posters did not recruit any informants. Instead, the OH directors OH contacted the three departments directly to recruit participants and I also used snowballing sampling during interviews. The fieldwork took 14 months due to the difficulties in recruiting the non-KIs. I had originally applied for six months R&D approval, so an extension and amendment[23] to the approvals had to be sought.

I had initially aimed to conduct non-KI interviews or focus groups with doctors, nurses and midwives from each of the departments in each of the LHBs. However, difficulties in

[22] See Appendix F for poster.
[23] To include the use of a poster in recruitment.

recruitment meant that I amended my recruitment strategy to include at least one informant from medicine, nursing and midwife in the department across the two LHBs, rather than in each [24]. These strategies eventually resulted in thirty four informants and included representatives from the three departments; eleven were KIs and twenty three were non-KIs (of which thirteen took part in four focus group discussions and ten took part in individual interviews). In terms of occupational groups, ten of the informants were midwives, eleven were doctors and thirteen were nurses. The organogram and table below (Figure 3.1) provide pictorial[25] and tabular representations of the informants in this study. Taking into account ANT's flat ontology, this organogram does not imply that the actants represented higher up in the hierarchy are necessarily more important or bigger actants in this network.

Figure 3.1: Organogram of Study Informants



[24] I did not feel that this was a particular issue as I was not conducting a comparative study as such.
[25] Using the organisational convention of a hierarchical structure

Table 3.1: Table of Study Informants

	LHB A	LHB B	GENERATION METHOD
Director of Medicine	1	1	KI interview
Director of Nursing	1	1	KI interview
Director of Midwifery	1	1	KI interview
Director of OH	1	1	KI interview
OH Nurse Manager	1	1	KI interview
Head of Emergency Planning	-	1	KI interview
ED Doctor	-	2	Non KI interview
ED Nurse	2	1	Non KI interview
ED Nurse	3	-	FG
Midwife	1	1	Non KI interview
Midwife	3	3	FG
Obstetrician	-	4	FG
Paediatric Nurse	2	-	Non KI interview
Paediatric Doctor	-	1	Non KI interview
Total	16	18	34

Sampling of non-KIs not only involved representativeness in terms of departments and occupational groups, but of vaccine acceptance and refusal, in attempt to use the notion of symmetry (Bloor 1976). I tried where possible to recruit equal numbers of acceptors and refusers (relying on self-reports of vaccination history), but this was not straight-forward given that influenza vaccination uptake was rarely a stabilised position[26] and the difficulties I faced in recruiting anyone at all. This was an attempt to avoid 'sampling by deficit' (MacDougall and Fudge 2001), which can make access and recruitment more difficult, and to use 'the sociological imagination' (Wright Mills 1959) to understand why HCWs do not accept influenza immunisation by problematising the behaviour that is seen 'as desirable or, at least,

[26] This finding will be considered further in Chapter Six.

not requiring an explanation' (Barbour 2007: 24; Jasonoff 2002). That is, why do HCWs accept influenza vaccination?

Only seven of the (key and non-key) informants were male and these were predominantly employed as doctors, with only one male nurse being interviewed. The gender bias in the sample reflects the staff composition of the NHS, where the majority of nurses and midwives are women, and this will soon be the case for doctors[27].

The number of focus groups that I held was determined by the comparisons that I wanted to make (Bloor et al. 2001; Barbour 2007). I wanted to look at differences between doctor, nurse and midwife groups, and also between the 'public' accounts presented in focus groups and the more 'private' of those in individual interviews. The groups were homogeneous in terms of hospital department and occupational group, and heterogeneous in terms of vaccination history (Morgan 1988; Barbour 2007). I decided to conduct separate focus group discussions for different occupational groups because I felt that mixed groups would have seriously inhibited the participation of some informants in the discussion due to 'professional conflicts or hierarchies' (Flick 2007: 88). Focus groups were, therefore, conducted with 'pre-existing teams'. It has been argued that this 'may facilitate more rounded or reasoned responses…An extra bonus for the researcher is the possibility of participants openly challenging each other's accounts of mutually accessible situations' (Barbour 2007: 34-35). Indeed, in all of the focus groups, informants challenged each other's accounts. Pre-existing or 'pre-acquainted' (Bloor

[27] Chapter Seven discusses the gender composition of the NHS and the gendered nature of this immunisation programme and HCW duties.

et al. 2001) groups may also have replicated the 'natural' context, for example group dynamics, under which the immunisation programme is experienced and discussed.

The size of focus groups was constrained not only by the availability of participants but also due to the requirements for successful moderation (Barbour 2007) and analysis (Bloor et al. 2001: 28): 'For academic research, successful analysis will, in part, be dependent on the ability to accurately attribute specific sets of interaction to individual group members and this may have implications for decisions regarding optimum size for the group'. Three of the focus groups consisted of three participants and the obstetrician focus group had four participants. Kitzinger and Barbour (1999) and Bloor et al. (2001) have asserted that it is possible, and sometimes preferable (Gray 1997), to conduct focus group discussions with such small numbers of participants.

At the beginning of the focus group discussions I asked the participants to read and sign the consent forms, and to complete pro-formas[28] in which some information required for analysis purposes such as age, occupation, grade and vaccination status was obtained. I asked 'each member of the focus group to identify themselves by first name at the beginning of the audio-recording' (Bloor et al. 2001: 42) in order to make transcription easier. I tried to guide rather than control the discussions in the focus groups in order to avoid distorting the group interaction (Bloor et al. 2001).

[28] See Appendix C for pro-forma/questionnaire.

I have tried to anonymise the research settings (i.e. LHBs and hospitals) and informants involved in this research, but given the limited number of seven LHBs in Wales and the small population of health professionals sampled (some with unique positions within their hospital and/or LHB), the organisational setting may be recognisable. For this reason I have not used informants' identification numbers in the thesis but have provided descriptions of their role with the data artefacts (i.e. quotes); for example, as key or non-KI, professional group (doctor, nurse or midwife) or speciality (OH, Emergency, Paediatric or Obstetric). Sometimes it was more important to label a quote as coming from, for example, a senior nurse, rather than from a KI, or vice-versa. The difficulty in guaranteeing confidentiality and anonymity in focus group discussions has been identified as an ethical issue (for example, Bloor et al. 2001). This may be particularly problematic with pre-existing groups, such as those in this study, which have to continue to work together subsequent to the focus group discussion.

Inclusion criteria for the study were that the non-KIs were qualified health professionals (i.e. doctors, nurses and midwives) working in the Emergency, Paediatric and Obstetric departments for at least three winter influenza seasons, beginning with the 2008-09 season (which was the one preceding the 2009-10 pandemic). This criterion was selected in order to be able to investigate whether the informants' acceptance of influenza vaccines has changed since the pandemic and whether this is due to changes in the delivery of the immunisation programme; this could be due to work done by the H1N1 pandemic influenza virus. This criterion means that less experienced health professionals were relatively excluded, particularly doctors, because they would not have stayed in one department for this amount of time due to the rotational nature of medical training. However, this time scale had the

advantage in that it allowed me to trace the effect of NHS re-organisation in Wales during 2009 on vaccine uptake. Furthermore, the extended data generation has meant that informants have been interviewed over both the 2011-12 and 2012-3 winter influenza seasons. Thus, allowing for analysis of how the programme has progressed over two seasons since the pandemic. I, therefore, combined synchronic '(i.e. in a single site over time)', and diachronic '(i.e. across a sample of cases at a particular time)' approaches 'pragmatically to suit the constraints of fieldwork and funding timeframes (Leonard-Barton, 1990)' (Greenhalgh and Stones 2010: 1290). However, the interviews were conducted more than a year after the pandemic was declared over, starting in November 2011 and ending in January 2013; and therefore recall bias in this study is possible and hindsight may have influenced responses.

My research design was emergent and the sampling strategy and focus of inquiry was refined as I engaged in the ongoing process of data generation and analysis (Lincoln and Cuba 1985). The questions asked in the interviews and focus groups were derived from the literature reviewed in Chapter One, my theoretical underpinnings (i.e. ANT, as outlined in Chapter Two) and through an iterative process. As I wanted to pursue more than one key question and wanted to focus on the issues that were important to the informants in the interviews and focus groups (as well as on those that were important to me), I used a semi-structured interview/focus group guide[29] (Patton 1990), rather than a schedule.

[29] See Appendix G for Interview/Focus group guide

I began each interview/focus group discussion with a broad question of what the informants' experiences of seasonal and pandemic influenza immunisation programmes, and of the 2009-10 H1N1 pandemic, was. I felt that informants' experiences were important because as Morgan (1997: 20) proposes:

> I, however, prefer to go beyond attitudes and opinions to emphasize learning about participants' experiences and perspectives. I emphasize experiences because even self-reported behavior is more useful as data than opinions that have unknown basis in behavior. I also prefer experiences because a discussion of them produces a livelier group dynamic – people are more than happy to compare different experiences, whereas they might be reluctant to challenge someone else's opinion.

Interviews and focus group discussions were conversational in style (Gubrium and Holstein 2002) and I followed the informants' leads. It was only towards the end of the interview/focus group that I would check if I had covered all of the topics, which varied according to the informant taking part (i.e. position within the immunisation network) and the time available for the interview[30]. Duration of interviews and focus groups discussions ranged from eight minutes to nearly two hours, with an average time of approximately forty five minutes. KI interviews were generally longer than non-KI interviews, reflecting their greater mobilisation in the network and/or their greater experience of being asked for their opinions. At the end of each interview and focus group I asked if anything that we had discussed had stood out as

[30] All interviews took place during the informants' work time and at their place of work. Some informants gave me a time limit, while others could be called away at any time and some had to answer phone calls during the interview. Key informants generally had more time available for the interviews and were more able to decide on this. In a couple of the non-key informant interviews other HCWs were also present in the room for at least some of the research encounter.

being particularly important, if there was anything that they thought that I might ask but didn't and if there was anything that they wanted to add.

Analysis

ANT does not provide any specific methods for analysis, apart from the aim to map a network; instead, they encourage 'sensibilities' for research (ref) and of 'sensitising concepts' (Blumer 1969: 148). As a novice ANT researcher, this has meant that I have had to develop my approach by building on existing ANT studies, particularly Singleton (2013), Cloatre (2008, 2014), O'Cuinn (2013) and Rooke (2011), discussions with my supervisors and other academics (at conferences etc.).

The analytic stage of my research began even before the data generation did, with the theoretically informed sampling of LHBs, hospitals, departments, professional groups and HCWs. Furthermore, ANT provided the 'theoretically informed approach to...analysis (by providing a conceptual tool and vocabulary that can form the basis for interpretations).' (Cresswell, Worth and Sheik 2010: 67). This analytical work continued throughout the iterative process of informant sampling and data generation, with concurrent audio-file transcription. I attempted to transcribe all the audio files for the interviews and focus group discussions as fully as possible, while keeping in mind that a verbatim representation of the interview/focus group discussion is not possible (Ochs 1979). This was time consuming, particularly for the focus group discussions where it was sometimes difficult to differentiate between participants or when they talked over each other. The resulting transcripts are artefacts of the audio-recordings and I treated these artefacts as 'research tools that are

designed to illuminate some – but not all- aspects of the data' (Coates and Thorn borrow 1999: 596); and where 'transcription is a selective process reflecting theoretical goals and definitions' (Ochs 1979: 44). Transcribing the data myself meant that I got to know my data really well and it was a pivotal stage in the analysis: 'Transcription is an *interpretative* act, where meanings are created, rather than simply a mechanical act of putting spoken sounds on paper (Lapadat and Lindsay, 1999)' (Braun and Clarke 2006: 87-8).

I initially tried using the qualitative data analysis software package NVivo to help me organise and analyse my data artefacts, but having not used the software to any great extent before I found it too time consuming to learn to use it properly and decided to code and analyse my data by hand. This was also prompted because the aim of the study was not to provide a thematic analysis but to map a dynamic network through in-depth critical thinking and analysis which would be fostered by sticking close to the data, rather than coding particular words or phrases. Furthermore, software programmes may be unsuitable for use with focus group data artefacts because the emphasis should be on 'the associations between *people* in the group [rather than]... between key words or phrases, or even sets of ideas' (Waterton and Wynne 1999: 133).

It is difficult to describe the analytic process because it involved the use of the sociological imagination and, often subconscious, inspiration. This can be particularly difficult to elucidate with ANT studies because the insights are not straightforward or conventional understandings. I have attempted to map the range of the nature of the phenomena, i.e.

map the network, and to provide an explication, rather than an explanation, because of the nature of the original research questions and the theoretical approach employed.

I generated four overarching themes, using the narrative of the journey of influenza vaccines through the parts of the network outside the LHBs, through the LHBs and into HCWs; and one concerning the bioethical issues in all parts of the actor-network. These became the four empirical chapters (Chapters Four, Five, Six and Seven). I then indexed data extracts (Coffey and Atkinson, 1996) into word documents for each of the four chapters and generated sub-themes within these data chapters (Frankland and Bloor 1999).

I took care to ensure that I did not focus on small 'chunks' of data to the detriment of the context within which that chunk sat (Lofland and Lofland 1995). This was particularly important for the focus group data, where one informant's utterance may have been part of a larger conversation with other informants (Catterall and Maclaran, 1997; Myers, 1998). For this reason, where data extracts from focus groups are provided I have indicated that this is the case and I have given that part of the conversation as a whole, with extracts from all the informants involved. I have also tried to consider how each response from individual focus group participants are part of their complete contribution to the focus group. This was done by organising each participant's responses into an individual document (Bloor et al. 2001). Individuals' documents were also compared against those of that focus group's other participants (Catterall and Maclaran, 1997). I have attempted 'to distinguish between opinion expressed in spite of, or in opposition to, the group and the consensus expressed or

constructed by the group' (Barbour and Kitzinger 1999: 16). I also compared between groups, i.e. between doctors, nurses and midwives, and within groups, i.e. between different members in the same group.

Reflexive Account

Some ANT scholars have proposed that: 'The term 'expression' is used to underscore the way that actor-network studies attempt to become part of the networks of which they speak. To be able to trace a network means becoming interior to its activities (Latour, 1997), or mobilizing one's own texts in its service' (Law in Law and Hassard 1999: 43). However, other ANT scholars have argued that researchers are outside of the network that they study and are, therefore, 'agnostic (or detached), typically eliciting textual or verbal data from human actants through qualitative interviews and observations. Here, humans are both informants (i.e. actants that generate accounts) and interpreters (i.e. the researcher as interpreting associations and components of the network)' (Cresswell, Worth and Sheik 2010: 74). I take a different view on this issue and conceptualise myself as having being enrolled and playing an active part as data generator and interpreter in the network that I study (Cresswell, Worth and Sheik 2010; Law 1997; Law and Hassard 1999; McLean and Hassard 2004; Singleton and Michael 1993). In order to provide some analysis of my effect on the research as researcher I will now supply a reflexive account of how I became enrolled as an actant in this network (i.e. how I came to undertake this research) and my role as a mediator (i.e. how I affected the data generation and transformed the network), rather than intermediary in the network. My identity is relevant to this research in at least two ways: It influenced the selection of the research area; and the generation and analysis of the data (Wetherell, Taylor and Yates 2001).

I came to undertake this particular empirical doctoral study through my sociological interest in vaccines which I had developed for my master's degree dissertation, after my daughter was offered the Human papillomavirus (HPV) vaccine. The dissertation was a Foucauldian Discourse Analysis (FDA) of the official and media discourses around the HPV vaccination programme in the UK between 2008 and 2010.

In addition to the circumstances under which I came to undertake this research, my personal characteristics have affected the data generation interactions with the informants. I conducted this research as a White, early 40s, female researcher with a Welsh working class 'valleys' accent. Some informants enquired about my background in interviews and focus groups and I told them that I am a PhD student at the University of Nottingham with a background in Sociology. This information was also provided in the information sheet[31] but it is impossible to know how many informants actually read this.

As a result, informants may have considered me to be an 'outsider' to the extent that I am not, and never have been, a HCW. Some informants seemed to think that I was trying to persuade them to have vaccination and were apologetic about not having accepted influenza immunisations. One tactic that I used in countering this misconception was to share my own or my children's vaccination history. For example, that I had not had an influenza vaccination

[31] See Appendix A for participant information sheet.

at that time[32], and that my daughter had not had her HPV vaccine but that my children have had all the other childhood vaccinations that were offered to them.

Nevertheless, several informants, including a KI, proposed that I, or the interview, may have changed their mind about being vaccinated and/or whether it is a duty of care to be vaccinated. I have also transformed this network in that a report I delivered to the collaborators has resulted in changes to their immunisation programmes.

Conclusion

I began this chapter by outlining how the theoretical approach and methodology for this study, ANT, affected the choice of data generation methods. This was followed by a description of benefits and limitations of these methods (KI and non-KI qualitative interviews and focus group discussions, and policy and document analysis), and an explanation of the ontological and epistemological positions that I hold. The impact of an ANT perspective on sampling choices was then considered before the iterative fieldwork and analysis stages of the research were detailed. Ethics were considered throughout the chapter rather than in a separate discussion, while an additional

[32] During the 2013-14 winter influenza season I was mobilised as a seasonal influenza vaccinee through the work of an immutable mobile, an honorary contract in the hospital that I was based in, while working for a university as a researcher. Influenza viruses and vaccines shaped my identity (i.e. as a vaccinee and researcher) and research practice. While not trying to persuade HCWs during the interviews and focus groups to accept influenza vaccination, I must acknowledge that this thesis, in particular my research aim, as outlined in Chapter One, is to inform debate and policy on the immunisation programme, and the implications for policy in Chapter Eight, may result in more HCWs being mobilised as vaccinees. I have tried to remain agnostic about the merits of HCW influenza vaccination but have changed my vaccination status during the course of the study and was invited by the WHO to become an external consultant for their Tailoring Influenza Immunisation Programme (TIP FLU) shortly after submitting the original (i.e. uncorrected) thesis for viva examination. Therefore, the thesis may be seen as pro-vaccination by some readers.

reflective account was also provided. Having described the methods used, the steps taken to generate the data, and the analytic approach, the following four chapters furnish the resulting empirical data for this thesis.

Chapter Four

The Journey into Local Health Boards

Introduction

The narrative in this thesis takes as its starting point that influenza, in the form of vaccines, and the known population impact of the virus, have already inserted themselves (through the mobilisation of human and hybrid actants) into pharmaceutical company networks, and national and supranational organisations[33]. My task is to trace how those vaccines travel from these organisations to their final destination which is inside the bodies of HCWs. Influenza viruses, in the form of vaccines, achieve this by building a network and set of passage points as it travels; this is done through the mobilisation (i.e. work) of heterogeneous mediators.

In this first empirical chapter, I examine the journey that influenza vaccines take through the extended part of this actor-network (i.e. outside the LHB organisations themselves). The actants that will be examined are supra-organisational (i.e. WHO), EU, ECDC and EMEA), legal (i.e. laws, regulations and guidelines), governmental (i.e. WG and UK government) and public health (i.e. PHW, NPHS, HPA and PHE).

[33] For an ANT account of how influenza inserted itself into these organisations see O'Cuinn (2013).

Beginning the Journey

The idea of how and when phenomena begin is not very well addressed in ANT. In fact these are not questions which ANT is interested in because rather than giving causal accounts, ANT is concerned with describing what happens, or what informants report happens, in networks. Furthermore, social constructionist sociological perspectives would argue that the idea of a beginning is a socially constructed label which has been retrospectively been applied to an event. ANT would add that the beginning of a network can always be traced back further to events that took place in other, pre-existing networks.

Nevertheless, before an influenza vaccine can begin its journey to vaccinees, it first has to be produced by actants in the network; and even preceding this stage, there has to be a desire to produce a vaccine. The drive to act comes from the objective and/or subjective conditions that have been identified by actants:

> Vaccine innovation starts with diagnosis, whereby previously unrelated symptoms are grouped as a disease, around a disease-causing pathogen (Rosenberg, 2002). Understanding disease mechanisms (pathogenesis) clarifies the problem, helps both define the operational principles needed to address the disease, and generate the collective vision and shared expectations which mobilise social, financial and political resources within networks as 'opportunities presented as promises, get accepted and become part of an agenda; and are subsequently converted into requirements that guide search processes' (Blume, 1992: 64e70; van Lente, 1993: 198) (Yaqub and Nightingale 2012:2145).

As was outlined in Chapter Two, the influenza virus was identified as the disease causing pathogen in 1933, with the invention of the electron microscope. Its PH impact had, however, been recognised since at least 1918. The influenza vaccine was co-constructed in the early 1940s, but it was not until 1999 that the HCW influenza immunisation programme was introduced in the UK.

The International Network

The first part of the journey being considered in this study begins with the movement from pharma. Pharmaceutical companies are dependent on WHO for their recommendation as to which strains should be included in the vaccines before they can start assembling and supplying influenza vaccines to healthcare organisations. WHO, and in particular its Global Influenza Programme (GIP), help to insert vaccines into the network by 'co-ordinating international [influenza and pandemic] surveillance, investigation and response' (O'Cuinn 2013: 16; Weir and Mykhalovskiy 2010). Weir and Mykhalovskiy (2010: 141) have proposed that:

> Global emergency vigilance represents an epistemological shift in public health reasoning that led to an historical break in which WHO was constituted as a suprasovereign power. Ours is a seeming Hobbesian tale of WHO's sovereign country members fearing lawless and anarchic pathogens so much that they decided to save themselves from the state of nature by enhancing the power of WHO as an interstate organisation, transforming WHO into a power over and above themselves to know about and deal with international public health emergencies.

WHO monitors influenza epidemiology and recommends which influenza strains should be inserted into yearly seasonal influenza vaccines through its global network of laboratories, in which the UK is a central actant. The WHO recommendation is induced by the mutation work done by influenza viruses, which gives the WHO some information on which to make a best guess as to which strains to include in seasonal and pandemic vaccines. It can be argued that influenza viruses push back against their insertion into vaccines by making it difficult for effective vaccines to be produced at all, and in sufficient quantities and in time to combat yearly winter influenza outbreaks; the various vaccine candidate seeds strains grow at different rates in eggs. So the yield of virus for vaccine manufacture is at best somewhat unpredictable and at worse not known properly until the manufacturing process starts each February/March. In turn this means that the delivery date of "1st week in October" is somewhat promissory and delays are not at all uncommon[34]. The vaccine forces us to wait for it to be produced and to work, i.e. immune response takes a few days. The agency is distributed between human and hybrid actants, i.e. people and vaccines.

In addition, some influenza viruses resist transformation into vaccines, because not all influenza strains are equally good candidates for re-assembling into vaccines. So the decision as to which strains to include is a compromise between closeness of the best guess of which circulating strain will be present during the winter season and existing knowledge about which strains make the best vaccines. The variable yearly geographical spread and severity of influenza outbreaks exacerbate these issues. In addition, influenza viruses do not always

[34] Such delays can have a significant impact on the delivery of the vaccination programme which has been organised months in advance to start on a particular date, as is considered in Chapter Five.

adhere to WHO's script and this sometimes results in an ineffective vaccine, if new strains emerge after vaccine production has begun; for example, in the 2014-15 winter influenza season, the vaccine was a poor match. The 'Immunisation against infectious disease' (Salisbury and Ramsay 2013: 192) publication, produced by the DH (commonly known as the 'Green Book') highlights the complexity and fragility of this network:

> Manufacture of influenza vaccines is complex and conducted to a tight schedule, constrained by the period between the announcement of the WHO recommendations and the opportunity to vaccinate before the influenza season. Manufacturers may not be able to respond to unexpected demands for vaccine at short notice.

In addition to recommending which strains should be included in influenza vaccines, WHO endorses that all countries should vaccinate their HCWs against seasonal and pandemic influenza. The UK has been enrolled into the global HCW influenza immunisation network by recommendations to immunise HCWs against seasonal and pandemic influenza viruses from international level actants, namely WHO and ECDC. In addition, since 2005 WHO, EC and ECDC help to insert pandemic influenza preparedness strategies into European nation states by providing guidance and support (Nicoll 2010; WHO 2009; EC 2005). In fact, in May 2005 with the opening of ECDC, it prioritised pandemics with the 'adoption of pandemic preparedness as its first disease-specific priority'.[35]

35 http://ecdc.europa.eu/en/healthtopics/pandemic_preparedness/national_pandemic_preparedness_plans/Pages/european-pandemic-preparedness-timeline.aspx [accessed 08/03/2013].

OH professionals proposed that the mobilisation of worldwide influenza virus surveillance and knowledge of pandemic influenza virus periodicity had helped to begin to mobilise action in the UK NHS network even before the 2009-10 A(H1N1) pandemic influenza virus had re-emerged. This surveillance can be viewed as the search for stabilisation of networks to make action possible in an inherently unstable actor-world. Here, influenza viruses are always pushing towards instability as a result of its own evolutionary response to selection pressures. Influenza vaccines push back against these selection pressures and are also pulled into networks, such as the HCW influenza immunisation programme, as a consequence. Furthermore, a KI from LHB B proposed that the SARS outbreak of 2002 to 2003 and the first reported human to human transmission of H5N1 avian influenza in 2003 created UK and international interest in pandemic preparedness[36], and awareness in NHS organisations. These other viruses helped stabilise the HCW influenza immunisation programme network that was partly glued together, and perpetuated, by relatively weak scientific evidence.

In March 2005, WHO enrolled a checklist for pandemic influenza preparedness planning, which included HCWs in the list of priority groups (Kotalik 2005), in an attempt to stabilise the pandemic network in advance (Dingwall, Hoffman and Staniland 2012). Then in April 2009 (just as the first reports of the H1N1 pandemic influenza virus were being confirmed), WHO introduced new hybrid actants, 'alert levels', which have acted as immutable mobiles, in the pandemic influenza network. These are transformed into actions to buy vaccines by other immutable mobiles, national hybrid actants, known as 'advance-purchase agreements'

[36] At least among developed countries which have the financial resources and infrastructure for pandemic planning.

(APAs), during influenza pandemics (Hine 2010). These alert levels may also have a role in encouraging HCWs acceptance of influenza vaccines. For example, Chor et al. (2009) found an association between upgrading of WHO alert level to level 5 and Hong Kong HCWs' acceptance of pre-pandemic H1N1 vaccine[37]. These APAs entered the UK network in 2004 when:

> The UK government started discussing the potential for advance-purchase agreements for pandemic-specific vaccine...These advance-purchase agreements allow the UK to receive a proportion of the production capacity of a specific company once a Phase 6 pandemic has been declared by WHO (Hine 2010: 111).

This was prompted by the actions of another international level actant, EMEA[38], which introduced another immutable mobile into the network: 'EMEA published guidance in April 2004[39] which allowed vaccine manufacturers to gain an authorisation for a 'mock-up'[40] vaccine ahead of a pandemic occurring' (Hine 2010: 111).

APAs can be crucial actants in pandemic influenza vaccine networks because (as Hine (2010) retrospectively defended of the 2009-10 H1N1 influenza pandemic) without them 'there was a real and significant risk that the UK would not be able to secure sufficient vaccine in the event of a pandemic' (Hine 2010: 111). In addition, they allowed the UK government room to

[37]However, Chor et al. (2009) did not find an association between WHO alert level and HCWs' acceptance of pre-pandemic H5N1 vaccines.

[38] Since 2005, this agency has been known as the European Medicines Agency (EMA).

[39] Committee for Proprietary Medicinal Products, *Guideline on Dossier Structure and Content for Pandemic Influenza Vaccine Marketing Authorisation Application* (CPMP/VEG/4717/03).

[40] 'A mock-up vaccine mimics the future pandemic influenza vaccine in composition and manufacturing method. However, as the pandemic virus strain is unknown, the mock-up vaccine contains instead another flu strain that humans have not been exposed to in the past. This enables the company to test its vaccine in preparation for any flu pandemic that may occur in the future by carrying out studies that predict how people will react to the vaccine when the strain causing a pandemic is included' (Hine 2010: 112).

negotiate the vaccines' enrolment in the UK network, both in terms of doses and timing of vaccine order fulfilment, when the international actant WHO had declared a pandemic:

> The advance-purchase agreements allowed the [UK] government considerable flexibility on the amount of vaccine to purchase once a pandemic had been declared, from 30 million doses up to 132 million doses, which is an amount sufficient for the whole population to receive two doses of vaccine. The 2007 National Framework and the advance-purchase agreements the UK government had in place with vaccine manufacturers therefore gave ministers both flexibility in the decisions they could make and the best chance of getting vaccine into the UK at the earliest point by having access to the first vaccine produced (Hine 2010: 112).

However, this negotiation room was limited, as APAs, once triggered, also work to ensure that, the UK's commitment to the buying of tens of millions of doses of pandemic vaccine is met whether, regardless of whether they would eventually be used or not. There was some flexibility in the 2009-10 pandemic, but a minimum legally binding commitment to buy 30 million doses.

It was July 2009 when WHO, ECDC and EU HSC enrolled HCWs into the pandemic network as potential vaccinees (Johansen et al. 2009): 'All countries should immunize their healthcare workers as a first priority to protect the essential health infrastructure'[41]. It is important to note here that, in this statement released during the 2009-10 H1N1 influenza pandemic, there is no mention of protecting HCWs, patients or the wider public, just 'vital health

[41] http://www.who.int/csr/disease/swineflu/notes/h1n1_vaccine_20090713/en/index.html [accessed 08/03/2013].

infrastructures'[42]. This chimes with Collier and Lakoff's (2006) observation which theorizes preparedness 'as a practice aiming to conserve political and economic infrastructure, arguing it has displaced practices oriented to conserving the health of population' (Weir and Mykhalovskiy 2010: 21). Here, I would argue that it is health infrastructure which is being prioritised over the health of HCWs, patients and the public. Furthermore, Banerji (1990) has expressed concern over WHOs recommendation, or even imposition, of healthcare programmes where there is insufficient evidence to support them. As outlined in Chapter One, the HCW influenza immunisation programme suffers from relatively frail evidential support.

Tirado et al. (2015: 113) employed an ANT approach to examine the new scales of action deployed during the H1N1 pandemic[43]:

> A(H1N1) influenza…reached the status of global threat virtually from its onset, triggering an international response with a diffusion, visibility and rapidity unparalleled in previous health alerts…this global condition cannot be explained solely by the epidemiologic characteristics of the disease, such as mortality rate, severe cases, propagation capacity, etc…the action of certain sociotechnical operators was what built a heterogeneous network of ideas, concepts and materials that turned the A (H1N1) influenza into a global-scale phenomenon with unprecedented speed. Among these operators, the most important ones were: the speaking position, a

[42] But it could argued that this might well be sensible and relevant for a pandemic situation. Also, WHO does recognise protecting patients through vaccinating HCWs against seasonal influenza as a concept (Dolan et al. 2012 a, b, 2013).

[43] In fact, Tirado et al. (2015: 113) propose that H1N1 revealed 'that we need new approaches [i.e. ANT] and concepts in order to understand how biological emergencies and health alerts deploy new scales of action'.

> discourse about threat, the protocols and guidelines that were used and, lastly, the maps that allowed a real-time monitoring of the influenza'.

However, the role of WHO in inserting pandemic influenza vaccines into the UK network was limited by the actions in the UK of the pandemic A(H1N1) influenza virus itself, which did not follow WHOs script:

> The planned linkage of decision-making to WHO phases proved of little use in practice, given the speed at which the latter changed and their lack of relevance to the UK's experience of the disease. The response rapidly moved away from this approach to take its lead from developments in the UK (Hine 2010: 48).

Pandemic influenza vaccines were physically inserted into the UK network by pharmaceutical suppliers in October 2009, although it wasn't until December 2009 that coverage was countrywide; but by this time the pandemic first wave had been and gone (May to July) and the second wave, starting in October, had already gone past its peak. Despite real time, or near real time, international surveillance co-ordinated by WHO, pandemic vaccines had not been inserted quickly enough to keep up with the actions of the H1N1 pandemic influenza virus. So while it is important to be aware of the global-scale in this network, as an ANT approach highlights, it is only ever the local-scale where action takes place. The rest of the chapter mainly focuses on the national- and local-scales of influenza vaccines' journeys.

The Welsh Network

Having traced some of the extended actor-network, the next stage of influenza vaccines' journeys is into the Welsh NHS itself. In order to understand the journeys that influenza vaccines take through the Welsh NHS, it is first necessary to understand something about the shape of the Welsh NHS network that the vaccines have to try to flow through, how it differs from that in England, Scotland and Northern Ireland, and the unstable nature of NHS networks.

The four devolved national healthcare systems share a history and core principles but, since devolution in 1999, their delivery of services has diverged more than ever[44] [45]. NHS Wales' policy direction has been the adoption of new PH tenets and 'localism':

> Wales has bet on *localism*. This means integrating health and local government in order to coordinate care and focus on determinants of health rather than treating the sick. It tries to use localism as the lever to make the NHS into a national health service rather than a national sickness service (Greer 2004:3).

Wales' policy direction is in contrast with the three other devolved nations of the UK. England opted for 'market principles' and private-sector participation. Scotland's health policy trajectory has been for 'professionalism', with its medical professional leaders having a strong

[44] The delivery of healthcare in the UK NHS was already diverse reflecting the history of services before the introduction of the NHS, and the heterogeneous nature of patient populations and funding allocated. This has resulted in the well-known 'postcode lottery' in UK healthcare.

[45] Seasonal influenza vaccines first inserted themselves into the UK NHS HCW immunisation network in 1999[45], at the same time as these four new national NHS organisations were being created.

influence on the policy of quality improvement and PH. Northern Ireland has stayed with 'permissive managerialism' (Greer 2004).

A KI at LHB B proposed that the mobilisation of PH tenets, i.e. prevention, rather than NHS Wales being an 'illness service' has helped with the mobilisation of health promotion activities (of which immunisation is one) into the Welsh network. However, another KI at LHB B reported that the Welsh PH agenda has yet to be successfully inserted into some hospital HCWs' network:

> *our staff who work in acute hospitals are very, very blinkered. You know they're so institutionalised in working in hospitals, they don't quite understand the public health agenda and the prevention agenda. Nurses that work more with children are far more aware of prevention and health promotion, etcetera and our community staff are...And I think there's a certain mind-set and their not used to thinking in that way around prevention. So we've still got a hell of a lot of work to do around that.*

Further devolution of powers to the Welsh NHS network occurred in 2007 with the transfer of health policy to the National Assembly for Wales. This was followed in 2009 with the re-assembling of the Welsh NHS network, by the insertion of seven new Local Health Boards (LHBs) and three 'all Wales trusts' (the Welsh Ambulance Service, Velindre NHS Trust (providing specialist cancer services), and Public Health Wales (PHW)[46]). At the same

[46] These seven LHBs took over from the previous actor-network of twenty-two LHBs and seven Trusts, which had themselves only been enrolled in 2003; and PHW replaced the NPHS, which had also been created in 2003. However, the term Local Health Board is only a legislative description and these organisations are more

time, the A(H1N1) pandemic influenza virus was inserting itself, through the mediation of human actants, into the Welsh network, as a KI at LHB B highlighted. The instability of NHS actor-networks was remarked on by KIs from both LHBs. Ham (1999) has also made the same observation.

A KI from LHB B reported that prior to the reorganisation in 2009, Welsh NHS Trusts, LHBs and Local Authorities (LAs) were enrolled and worked together to try and insert pandemic influenza plans into their networks. However, pandemic plans were reported by Hine (2010: 47) as working to constrain possibilities for action during the pandemic:

> Thus I heard that, at times, it had felt as if the response was being tailored to fit what was in the plan, rather than the nature of the virus itself. In other words, there was neither sufficient flexibility over response options nor scalability to tailor the response more closely to the emerging pandemic.

A KI at LHB A proposed that the Welsh healthcare reorganisation in 2009 may have had a detrimental effect on the insertion of influenza vaccines into the new LHB organisations during the pandemic because associations in these new healthcare actor-networks had yet to be stabilised; but that this negative effect was tempered by associations between human actants within the previous health boards which remained, despite the fact that the organisations themselves no longer existed. Clegg Smith (2002) also found that NHS

regional than local; in fact, the term 'NHS Trust' is more apt. None of the LHBs have the term LHB in their name, three just use the term 'Health Board', one 'Teaching Health Board' and three 'University Health Board'.

reorganisation in England was helped by the stability of human actants, even when the organisations they worked in had been re-assembled.

The previous informant also proposed that the greater number of associations in the larger LHBs, with more heterogeneous human actants (HCWs and LA staff) helped to insert pandemic influenza vaccines into the new networks. However, a KI at LHB B reported that the reorganisation of Welsh networks during the pandemic had a negative impact on the mobilisation of their vaccination champions because reorganisation issues competed more successfully for their mobilisation. This competition for mobilisation of actants does not just apply during periods of reorganisation and throughout this study I will highlight the competing network engagements in which core actants are embedded.

Furthermore, a KI at LHB B proposed that the associations between actants, in terms of collaboration, were more important than whether or not they belonged to the same organisation. In addition, a KI at LHB B reported that HCWs often identify more with the hospital that they work in rather than the larger LHB organisation of which the hospital is part and therefore the change in organisation would have had little effect on the stabilised organisational culture of the individual hospital.

However, KIs at LHB A put forward that associations between human actants in the new organisation, in the form of electronic communication between people, had yet to be re-assembled during the pandemic. In addition, the previous KI at LHB B testified that

communication is still a challenge in their LHB (in 2012) and that the size of the new organisation means that influenza vaccines have to compete with other actants to enrol the Chief Executive's mobilisation more than they would have done in the previously smaller constituent Trusts. However, other KIs at both LHBs testified that the enrolment of a new organisation into the network and becoming unified (i.e. with the previous NHS Trusts and LHBs) did change the organisational culture and make a positive difference to the HCW immunisation programme because associations are easier to manage within rather than between organisations.

Furthermore, KIs at both LHBs proposed that becoming a LHB strengthened the associations with PHW and that this may have had an influence on HCW influenza vaccine uptake. For example, a KI at LHB A reported that PHW was a valuable source of information concerning how long they would have to mobilise their HCW immunisation campaign for during the pandemic. But PHW's enrolment in the pandemic network only went as far as '*the overall planning approach'* did not extend to actually inserting the vaccine into HCWs, as a KI at LHB B highlighted. Moreover, the closer association between the LHBs, PHW and the CMO for Wales was not always reported by OH professionals as a positive addition to the network, as it was these actants (through a letter from the CMO for Wales) who enrolled the LHBs to vaccinate non-LHB staff (i.e. LA workers). They suggested that this addition to the network resulted in fewer vaccines travelling to HCWs because the vaccines and vaccinators were diverted to other potential vaccinees.

Therefore, there was no consensus among informants as to whether the enrolment of these new LHB actor-networks into the Wales immunisation network had any effect on the insertion of influenza vaccines into HCWs, i.e. made it easier or more difficult to travel. Although more informants at LHB B than LHB A felt that it did not have an effect on the insertion of the influenza vaccines into the LHB and uptake of vaccines by HCWs. This may be due to the fact that LHB B had a much smaller increase in staff numbers on becoming a LHB as compared to LHB A, as a KI in LHB B highlighted.

The UK Network

Despite devolution, the four nations of the UK have worked together to a certain extent in their seasonal and pandemic vaccination programmes, and in their pandemic influenza preparedness plans. Therefore, it is important to understand influenza vaccines' journeys through the UK, as well as Welsh, national health services. The following section describes this part of influenza vaccines' journeys.

The UK Government's Department of Health (DH), through the JCVI, governs the highly centralised vaccination and immunisation policy throughout the UK (Hobson-West 2005). International and supranational actants (i.e. ECDC and WHO) have enrolled, in line with recommendations, the UK Government to define frontline HCWs to be at nosocomial risk of contracting and transmitting influenza (Salisbury, Ramsay and Noakes 2006). In 1999, it recommended that HCWs should be vaccinated every year through NHS OH providers; this

recommendation continues to do work to construct the UK yearly national HCW influenza immunisation programme[47].

Since 2000 national annual guidance has been issued, promoting HCW immunisation against (seasonal) influenza (Donaldson 2001). Immutable mobiles in the form of yearly letters from UK Government, DH actants, the CMOs[48] of England, Wales, Scotland and Northern Ireland, have helped to insert and re-insert influenza vaccines for HCWs into their respective national NHS organisations. For example, letters from the then Chief Medical, Nursing and Pharmaceutical Officers for England in 2000 and 2001, affirmed and re-affirmed, respectively, that 'The Chief Medical Officer has recommended that Immunisation against influenza of healthcare workers should be part of winter planning for health service providers' (HSC 2000/016) and 'As last year, NHS employers should offer influenza immunisation to employees directly involved in patient care' (Donaldson 2001: 4). This has been reinforced by another immutable mobile, a statement from the GMC, to physicians in practice, that: 'You should protect your patients, your colleagues and yourself by being immunised against common serious[49] communicable diseases where vaccines are available' (GMC 2006). However, similar statements have not been issued by representative bodies from other health professions, including the RCN and RCM (RCN and RCM, personal communications to RH, 2012). Several informants proposed that such statements, from professional bodies and councils, have the potential to be important actants in the network.

[47] This will be considered further in Chapter Five.

[48] The role of Chief Medical Officer in England and Wales is intimately linked with epidemic networks, as the role was created to help prevent cholera epidemics in the mid to late nineteenth century.

[49] The perceived severity of influenza by HCWs will be discussed in Chapter Six.

In addition, a variety of hybrid, legal actants in the form of Acts of UK Parliament, regulations and codes of practice can be mobilised to facilitate the flow of influenza vaccines into the UK HCW immunisation network: The 'Code of Practice' for health and adult social care on the prevention and control of infections; The Health and Social Care Act 2008; the Health and Safety at Work Act (HSWA) 1974; the Control of Substances Hazardous to Health Regulations (COSHH) 2002; the Reporting Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR); and the Management of Health Safety Welfare Regulations 1999.

The legal basis for this immunisation programme is important because 'public health cannot function well unless it has strong legal foundations' (Gostin 2002: 136); but this does not mean that the legislation will be implemented. There is a large body of literature concerning the difference between 'law in action' and 'law on the books' (e.g. Pound 1910; Llewellyn 1930; Halperin 2011). In this case, I can see that while the law on the books supporting HCW influenza immunisation is arguably substantial, the law in action is:

> trivial or non-existent (e.g., systemic non-compliance with poorly enforced safety regulations)...The influence of law is indeterminate in these various contexts because of factors other than law which have an impact on the decisions. Some of these factors are: the incentives for compliance and non-compliance...resources available to different parties...personal and cultural values of the parties...and the overlapping relevance of different and sometimes inconsistent laws as understood and interpreted by the parties (Clune 2013)[50].

[50] https://newlegalrealism.wordpress.com/2013/06/12/law-in-action-and-law-on-the-books-a-primer/

This study reveals that all these factors are involved in this immunisation programme.

Furthermore, it could be argued that this immunisation programme is lacking one important legal actant, a legal mandatory policy for vaccination. In addition, as Cloatre and Pickersgill (2014: 439) said of international law, national healthcare policy and legislation 'can only acquire agency if enacted through local practice'.

However, some ANT scholars have highlighted that national legislation is not always necessary to ensure the flow of pharmaceuticals in national networks[51]. Cloatre (2014) found that regulation became embedded in drugs and travelled with those pharmaceuticals from the regulation's country of origin to other countries where such regulation did not officially exist, but nevertheless mobilised human actants to act in similar ways to actants in the country of origin. Indeed, some informants from LHB B proposed that mandatory HCW influenza immunisation 'socially exists independently from any written rule' in ICUs[52] [53] (Cloatre 2014: 98). This 'de facto ordering' adds another passage point through which influenza vaccines can enter this network (Cloatre 2014: 99).

[51] Chapter Seven considers the unofficial mandate which is inserted in some hospital departments, but not others.

[52] By extension, also Paediatric Intensive Care Units (PICUs).

[53] ICUs and PICUs have not been explicitly examined in this study. Therefore, the associations that explain how mandates find a way of acting in ICUs and PICUs, 'although they have not been officially created by written law in the country', are not considered here (Cloatre 2014: 100). However, this may be an important line of enquiry for future research, where material and social connections rather than written texts may be the more important actants.

The relevance of the formal legislation, present in the network, for HCW immunisation is set out in another hybrid actant, the 'Green Book', which is regularly updated online (or in ANT terms, re-assembled). In addition:

> The Green Book, *Immunisation Against Infectious Disease*, provides guidance for health professionals on administering the flu vaccine. The influenza chapter (chapter 19) is updated each year following review by JCVI and published ahead of the vaccination programme. It is important that all those involved in the flu programme are familiar with this chapter. Alongside the Annual Flu Letter issued by the Chief Medical Officer for Wales, this comprises all the essential information needed by healthcare professionals in the implementation of the flu programme (WG 2013: 6).

OH professionals agreed that the 'Green Book' is a key actant in their network, helping to insert vaccines into the LHBs. Some KIs, however, proposed that the 'Green Book' and CMO letters do work to limit influenza immunisation to HCWs that are defined as 'frontline' to the exclusion of other HCWs and LHB employees (i.e. in ANT terms to 'cut the network'), who may also be an important transmission risk due to their contact with lots of people as part of this role; as a KI at LHB B explained:

> *I do understand why the CMO's target only links round frontline staff but for us all our staff are valuable, and this is a way of demonstrating that to them. We've got plenty of vaccine, so let's do them and we'll put the effort into delivering it, we'll do any comers...we have been responsible for quite robustly interpreting...what the Green Book had said about vaccinations and immunisations.*

As outlined earlier in this chapter, there is a UK 'National Pandemic Preparedness Framework' and national APAs. In terms of vaccine enrolment, the larger UK network was thought to be more effective at procurement and co-ordination as a collective, rather than as individual devolved nations:

> Unlike most emergencies, an influenza pandemic requires significant central government co-ordination over an extended period. The Department of Health (DH) has overall responsibility for preparing for a pandemic and leading the response. Given the expected impact of a severe pandemic on life in the UK, other government departments will also have an important role to play in managing its impact across a wide range of policy sectors (Hine 2001: 41).

However, each nation also has its own pandemic preparedness plan, which is in line with the UK-wide National Framework but was adapted to fit their particular needs.

Prior to the 2009-10 A(H1N1) influenza pandemic, the UK Cabinet Office and the DH, in particular the then CMO for England, Sir Liam Donaldson, as chair of the Pandemic Influenza Programme Board which oversaw the development of the 'National Flu Pandemic Framework' in 2007[54], started to facilitate the flow of pandemic influenza vaccines into the UK HCW influenza immunisation network even before A(H1N1) pandemic influenza virus had emerged in 2009; and it also 'formed the basis for the 2009 pandemic response' (Hine 2010: 21). This was followed with the introduction by the Cabinet Office in 2008 of another hybrid

[54] *'Pandemic Flu: A national framework for responding to a pandemic*' was updated and replaced in the network by the *UK Influenza Pandemic Preparedness Strategy 2011*, which 'has been developed jointly across the four UK Governments, with professional, NHS, social care and public health organisations, and based on advice from clinical, scientific and other experts' (DH 2011: 8).

actant, and immutable mobile, into the network, the 'National Risk Register for Civil Emergencies' (NRR)[55], which positioned pandemic influenza as having the highest level of relative impact and a relatively high likelihood of happening and therefore being 'the most significant civil emergency risk' (Hine 2010).

One of the most important ways in which the National Flu Pandemic Framework in 2007[56], started to facilitate the flow of pandemic influenza viruses and vaccines into the UK HCW influenza immunisation network was by the introduction of new hybrid actants, more immutable mobiles, in the form of 'sleeping contracts with vaccine manufacturers to purchase enough vaccine to immunise up to 100% of the population, to be triggered by WHO declaring a pandemic' (Hine 2010: 21). This is exactly what the H1N1 influenza virus mobilised the WHO to do on 11th June 2009 (Eurosurveillance editorial team), i.e. WHO raised its pandemic alert level 'to its highest phase in response to a novel strain of A(H1N1) influenza' (Rosella et al. 2013: 2)[57].

[55] The NRR was updated by the Cabinet Office and re-inserted into the network in 2010 and 2012 with pandemic influenza remaining 'the most significant civil emergency risk' in the register despite the mild nature of the 2009-10 A(H1N1) influenza pandemic.

[56] The Framework was updated by the Cabinet Office and re-inserted into the network in 2010.

[57] This decision has caused some controversy in the wake of the 'mild' pandemic which took place. Commentators have considered the secretive nature of WHOs decision making process and associations between WHO actants and pharmaceutical have now been unblackboxed and this may have long-lasting effects on WHO as a central actants in this vaccination and other networks.

Pandemic Influenza Vaccines' Journeys into Local Health Boards

'The H1N1 pandemic was the first UK-wide crisis in a devolved policy area' (Hine 2010: 5).

As mentioned in Chapter Two, the ANT approach is particularly useful in novel situations, such as pandemics, where the work done by non-human and hybrid actants comes into view. The following section describes how national actants both smoothed and obstructed the flow of vaccines through healthcare networks during the 2009-10 H1N1 pandemic.

In Wales, the Health and Social Services Directorate is responsible for health and social care preparedness, including pandemic preparedness. The CMO for Wales leads on PH, the use of vaccines, and other medical countermeasures. However, the CMO for England (in collaboration with the three other CMOs and the Civil Contingencies Secretariat (CCS)) remains a key actant in the devolved national networks by providing PH information and advice to the UK Government, and by making statements encouraging HCWs to accept pandemic influenza vaccination. The Committee on the Ethical Aspects of Pandemic Influenza (CEAPI) was set up on the recommendation of the CMO for England in 2005. Similarly, the HPA[58], which entered the network in 2004 and is the PH service in England, is the lead actant (in collaboration with the PH services in the three devolved nations) in giving PH advice to the UK DH. A KI at LHB A proposed that the English PH actant at the time, the HPA, in addition to the Welsh PH actant at the time, the NPHS, also did work inserting information into the Welsh network during the pandemic. Another OH professional highlighted that this insertion was

[58] HPA was replaced by Public Health England (PHE) in April 2013.

not stabilised, as it was voluntary, with Welsh LHB actants having to do work to insert the HPA into their net.

The HPA (and now PHE) is just one national actant involved in inserting pandemic influenza information into the UK network. The UK National Influenza Pandemic Committee (UKNIPC) provided specialist advice to the UK DH, until 2007 when the Scientific Pandemic Influenza advisory committee (SPI) was inserted into the network. The SPI was merged into SAGE in May 2009, which was itself replaced by the New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) in 2014. UK Government Ministers and UKNIPC are in turn 'advised about the scientific evidence base for health-related pandemic influenza policies by the Department of Health's Pandemic Influenza Scientific Advisory Group (SAG)' (O'Cuinn 2013: 20). In a pandemic, the CCS[59], which sits within the Cabinet Office of the UK Government, links international, national, regional and local actor-networks (O'Cuinn 2013); but its main function is to link the various government ministries into a unified and co-ordinated governmental response to major events. As far as supranational agencies are concerned, EMA approved A(H1N1)v2009 vaccines 'after an accelerated assessment procedure' (Durrieu et al 2012: 846). The pandemic influenza virus, therefore, mobilises actants to act more quickly, in order begin their journey into vaccinees sooner than seasonal vaccines do and to extend the seasonal programme target groups to include more potential vaccinees. This is due to the perceived greater threat in terms of more severe morbidity and

[59] Civil Contingencies Secretariat, _Civil Contingencies Act 2004: a short guide (revised)' (London; Cabinet Office, 2004).*Civil Contingencies Act 2004: a short guide (revised)*.

more mortality of the pandemic virus, and the greater number of people at risk from this, compared to annual seasonal influenza viruses.

The enrolment and mobilisation of UK-wide networks established to plan for a pandemic was also used during the 2009-10 A(H1N1) influenza pandemic, when the UK Government mobilised a new national-level hybrid actant into the UK NHS HCW influenza immunisation network, a four nations health group, which, an independent review of the pandemic response reported, stabilised the enrolment of the four nations in the network (Hine 2010). This group was reported to be a key actant in the timing of insertion of the pandemic vaccines into the network (Hine 2010).

In addition to this group, the organisation of a UK-wide, central government network, under the jurisdiction of the UK DH was, and remains, particularly important for influenza pandemics, as reported by an OH professional. It was the UK government that was responsible for designating frontline HCWs as a priority group for vaccination during the 2009-10 influenza A(H1N1) pandemic (JCVI 2009). However, like seasonal programmes, the HCW pandemic influenza vaccination programme was voluntary and HCWs did not need to comply with the recommendation.

The first step for the UK–wide actant, the DH, was to enrol pandemic vaccines into the network by setting up and mobilising APAs with pharmaceutical companies. This was done by DH and the four nations group under the recommendation of SAGE and the guidance of

the JCVI[60]. However, 'Agreeing a procurement deal for pandemic flu vaccine that delivers good value for money is complex' (Hine 2010: 112).

This is important because influenza vaccines are economic, as well as biological, actants: 'plans to purchase up to 132 million doses of vaccine, sufficient to protect the whole of the UK population...were soundly based in terms of value for money, reflecting the inherently low cost of vaccination in relation to the value of lives saved' (Hine 2010: 3). However, this is only true when an optimal immunisation programme can be delivered: 'A sub-optimal vaccine programme has large financial [in addition to health] implications. For example, in the UK £1.2 billion was spent on 29 million vaccines [during the 2009-10 H1N1 influenza pandemic] and also on antivirals and antibiotics; 20 million doses of vaccine were ultimately not used' (Hine 2010: 6). In addition, 'it is impossible to know for sure by how much morbidity and mortality were reduced by the countermeasures' (Hine 2010: 26).

SAGE, JCVI and the four nations group were key actants in inserting pandemic influenza vaccines into the HCW immunisation programme network, as soon as they were available and for as long as possible (Hine 2010). It was important that HCWs were prioritised by the JCVI for early pandemic immunisation in order to enrol vaccines in the network because: 'Although the UK ordered enough vaccine for 100% of the population, initial supplies of vaccine were

[60] 'The JCVI is a standing advisory committee with statutory responsibilities 'to advise the Secretary of State for Health and Welsh Ministers on matters relating to the provision of vaccination and immunisation services, being facilities for the prevention of illness'.[2'] 2www.dh.gov.uk/ab/JCVI/DH_094787 (Hine 2010: 67).

very limited. The UK therefore had to decide which groups to prioritise' (Hine 2010: 115). However, the role of SAGE in facilitating pandemic influenza vaccines into the network and the timing of JCVI mobilisation was questionable:

> SAGE provided advice to the CCC on vaccination, but in effect relied on the JCVI as the statutory body to provide it. I have heard differing views on using SAGE as an extra step before advice on vaccination was presented to ministers. Several interviewees were sceptical about the usefulness of providing an additional hurdle for JCVI advice to clear before being presented to ministers. Others felt that SAGE provided a useful challenge function for JCVI advice. The SAGE challenge function is a critical one, but it should not delay ministers from receiving timely advice on vaccination. In more serious pandemics it will be essential that JCVI advice is available to ministers on a timely basis. This may require the JCVI to meet outside its normal meeting schedule (Hine 2010: 73).

One of the rationales for the implementation of UK-wide actants into the pandemic network was the idea that pandemic influenza viruses: '[as] infectious diseases do not respect borders, it makes little sense to try to adopt radically different policies across the UK' (Hine 2010: 41). To some extent though, the 2009-10 A(H1N1) pandemic influenza virus did not adhere to this script either:

> The spread of pandemic influenza within the UK was far from uniform. Some areas were 'hot-spots' while others were largely unaffected. Some 'hot-spots' saw pandemic-level activity before WHO officially announced a pandemic. Northern Ireland and Wales were affected later, and had a significantly milder disease profile than England and Scotland during the first wave of infection. These developments

> were unexpected, and the National Framework talks consistently of taking a UK-wide approach to the response. While recognising the devolution settlement, it does not suggest that the response may, for example, be varied within England to reflect differing experiences across the country (Hine 2010: 48).

Furthermore, H1N1 did not meet the highest rating ascribed to influenza pandemics in the NRR (2008) (Hine 2010).

Despite the UK-wide pandemic plans, some devolved nations of the UK implemented actants into the network, which competed with pandemic vaccines, that others did not. For example, England administered anti-viral medication to the public by means of a hybrid actant, a telephone advice line; whereas Wales mobilised human actants in the Primary Care sector. An OH professional proposed that this was because of differences in hybrid actants (i.e. resources and structures) in the Welsh and English networks.

Abraham (2002) has highlighted, from a realist perspective, the issues that arise from inconsistent or contradictory PH decisions in different countries. This is particularly relevant where the two countries (i.e. England and Wales) are so closely, both geographically and governmentally, entangled. A KI at LHB B reported that a significant amount of LHB resources were mobilised in trying to insert anti-viral medication into the Welsh network before the decision was made to unenrol the hybrid actant, the telephone advice line, from the network. However, the same informant proposed that this unenrolment was a positive outcome for the Welsh network: *'But I'm glad we didn't in the end because it worked much better not,*

because it was really confusing for people'. However, other KIs proposed that this decision may have had the opposite effect on the Welsh public; as a KI at LHB B testified:

> *Umm did it work? Probably not that helpful because we were getting lots of information coming through from NHS England that were doing it differently, they had different call centres. One of the things that came across fairly early on was that the then Welsh Health Minister wanted to make sure that what was happening in Wales was not going to be the same as England. We weren't going to go down the call centre line, we weren't going to have people triaged. And the frustrating thing about that, although that was focused at people in the community with illness and apparent ease to pick up anti-virals, the big issue was that our employees would be looking at the same TV programmes and reading the same newspapers as Joe Bloggs who's an individual.*

In addition, to the importance of UK-wide actants in the pandemic campaign, OH professionals and other KIs at both LHBs reported the key role of devolved national actants in the Welsh network. WG, and in particular the CMO for Wales, were two such actants. Informants reported that they supplied fridges and vaccination accessories, information and guidance.

Another difference between England and Wales was the inclusion of another hybrid actant, this time in the Welsh network, the Welsh language[61] An OH professional proposed that this 'bilingual agenda' may have slowed down the flow of vaccines through the Welsh network. However, a KI at LHB B reported their LHB bypassed this temporary blockage through the insertion by the LHB of information about H1N1, rather than waiting for WG immutable mobiles to be ready for deployment. Much like a virus or a social value[62], the Welsh language is a set of ideas that makes itself manifest through the enrolment of various actants (i.e. human, material and non-material[63]). For example, Welsh speakers, Welsh documents and Welsh words, respectively.

However, a KI from LHB B proposed the reason for WG's slow mobilisation was the novel nature of the pandemic and the governmental processes (i.e. associations) that they have to use. In addition, WG's work at attempting to insert the pandemic influenza vaccine into the net was not always successful, as KIs, including this one from LHB B, reported:

> *The chaos was in terms of consistency of information that was coming out from the Chief Medical Officer in the Welsh Assembly in that these groups could be targeted. ...clarity of which group should we be targeting and that changed as we went through the campaign. The other thing, there was the employee response "why does that person get a vaccination and I don't" and that "I'm not as important as them".*

[61] Relatively few ANT scholars have worked in officially bilingual settings and, as such, this is an underdeveloped area of this approach.
[62] Social values as actants will be considered separately in Chapter Seven.
[63] I will return to issues of actants that are neither human nor material in Chapter Seven.

In addition, KIs at LHB B proposed that communication problems were, if anything, exacerbated by the over association of human actants (i.e. too many meetings) and the enrolment of too much information in the net, partly through the mediation of electronic actants (i.e. email). However, other KIs from LHB B, while agreeing that WG may have inserted too much information into the net, proposed that it was the responsibility of the LHB's to filter this information down to staff.

The CMO for Wales was reported, by an OH professional, to be a key actant in inserting pandemic influenza vaccines into pregnant HCWs. As was a national organisation, the RCM, as a KI at LHB B testified. Another OH professional recounted that this attempted insertion by WG and the CMO for Wales was not straightforward, because other actants (i.e. pharmaceutical companies) had their own reasons for not wanting to insert influenza vaccines into pregnant women, including pregnant HCWs:

> *I think the discrepancy came between what the government was saying and what the manufacturer was saying...You know manufacturers err on the side of caution, you know they don't want and no vaccine probably should be given in the first trimester...I just think there were some discrepancies and I can't remember whether they said originally not to but I thought the government did say to do it to [immunise] pregnant women from early on. The discrepancy came around the manufacturers details said not to and they didn't change, they kept it to say not to. But everybody had to learn the message of the discrepancy.*

Furthermore, even where the same messages were being inserted by different actants this also led to confusion for pregnant women where too many hybrid actants, immutable mobiles in the form of information leaflets, were being inserted into the net; which in turn could have resulted in pregnant HCWs not being mobilised as vaccinees. Oaks (2000) also found that pregnant women received confusing health advice.

As well as the timing and quantity of information coming from WG, the nature of this information was also problematised by KIs, including one who seemed to suggest that the virus destabilised the network through its unforeseen mild action:

> *I think initially there was perhaps, well I think there was mixed messages because all the pandemic planning, those involved with that, the thinking was that H1N1 could actually have been a more virulent and cause more severe illness than perhaps it otherwise did, certainly in terms of things like service disruption both in the health service and more widely and that didn't really materialise I don't think in quite the way that some of the planning thought it might. So in some senses perhaps there was some messages that it wasn't quite as severe as it was. Likewise perhaps the other evidence was that it wasn't as severe as it might have been.*

Furthermore, KIs commented on the lack of enrolment of hybrid actants, i.e. teleconferencing, by some LHBs, to facilitate association between the human actants in the Welsh network; but without the associated expenditure in terms of travelling time. In this way, the hybrid teleconference actant can be seen to fold time and space, thereby facilitating and expediting the flow of vaccines.

However, a KI at LHB B also proposed that meeting in person (i.e. direct associations without having to enrol intermediaries such as teleconferencing facilities) can help to insert new ideas and contacts into the network. Hine (2010) made similar observations about the lack of use of teleconferencing by the four nations group during the pandemic. In contrast, a KI at LHB B reported that teleconferencing was mobilised in the internal LHB networks during the pandemic. In addition, KIs from both LHBs also attempted to deproblematise WG's mobilisation, particularly in terms of the information that they gained from the meetings; as a KI in LHB B reported: *'having someone available once a week from WAG to do this, I think was a good investment on their part as well...you learn a lot from other people'.*

WG's insertion of pandemic vaccines into the LHBs was in turn dependent on the LHB OH[64] departments regularly supplying WG with uptake figures so that WG could insert more vaccines into the network. These figures also monitored how many HCWs had been vaccinated every week, which was a government requirement. National enrolment in the production of immunisation statistics in fact began prior to the pandemic, when NPHS was still an actant in the Welsh network.

The work of inserting pandemic influenza vaccines into LHBs was therefore achieved by associations between heterogeneous actants from supra-, (UK) national and devolved national organisations; not all of which were successful. Partly this was due to the H1N1 pandemic influenza virus itself, which did not conform to pandemic plans and alert levels. To

[64] The role of OH in inserting vaccines into HCWs and reporting uptake is considered in detail in Chapter Five.

some extent though, the introduction of new healthcare organisations into the Welsh NHS network at the time of the pandemic, the complex relational ontology of the UK healthcare system and the insertion of too many or late immutable mobiles also had important parts to play in the pandemic network.

Post-Pandemic Influenza Vaccines' Journeys into Local Health Boards

It was WHOs Director-General, Ban Ki-moon, who declared that the H1N1 pandemic was over on 10th August 2010 (WHO 2010a); although the flow of pandemic vaccines into the LHBs had ceased a couple of months before. It has been estimated that H1N1 had caused between 151,700 and 575,400 human deaths worldwide and 1237 to 4946 in the UK (Dawood et al. 2012). This compares with between approximately 250,000 and 500,000 people dying annually worldwide from seasonal influenza infection (WHO 2009). However, informants from both LHBs proposed that these statistics obscured the morbidity caused by the 2009-10 H1N1 pandemic which put a more severe strain on health services than during annual seasonal winter influenza outbreaks, which healthcare organisations were already struggling to cope with, not only due to influenza but also from other illnesses which contribute to 'winter pressures' and demand mobilisation from healthcare organisations and HCWs; as a KI from LHB B reported: '*You know because there was high admission rates, flow was really difficult, sick patients, ITU lots of people going in there, young women dying…I think we sometimes forget that and we should learn'.* This quote also highlights the instability of the network due to LHB staff forgetting about the seriousness of the pandemic, as other issues compete more successfully for space in their knowledge assemblage.

In the 2010-11 winter influenza season (i.e. the season directly following the 2009-10 pandemic), seasonal vaccine uptake by HCWs in Welsh LHBs was lower than pandemic vaccine uptake during the pandemic. A KI at LHB A proposed that this was due to the destabilisation through the recent insertion of LHBs into the Welsh NHS network and a new Chief Executive into LHB A which meant that '*high level leadership prioritisation, communication, I think that's really, really key*' was not able to be mobilised in LHB A's network. While the fieldwork for this study was being undertaken, LHB actants were trying to re-establish the stability of their healthcare organisations.

These low uptake figures and a more severe post-pandemic winter influenza virus during 2010-11, which now included the H1N1 strain, resulted in the re-mobilisation of WG in 2011, which was in turn partially successful in re-mobilising the LHBs; as KIs reported:

> *are held to account to the Welsh Government about our compliance of vaccines, which is why we all had a thrashing last year [2010-11 season] because all of us on the whole last year didn't do very well last year.*
>
> *this year [2011] yes we changed because there was a lot of central pressure that we will no longer tolerate vaccination rates of single figures or even double figures. We are looking at the majority of the work force being covered, so there was the push behind it.*

This was followed, at the start of the 2011-12 winter season, with the mobilisation of WG, PHW and a new Welsh actor-network, a national working group, to insert a frontline HCW immunisation target of 50% and new promotional materials into the Welsh LHB network.

Health programme targets have been subject to discussion for over 25 years (Bose 1988, Bose 1996, Balakrishnan 1996; Coutinho, Bisht and Raje 2000). Targets have been described as '…conceptually constructed (Bourdieu, Chamoredon & Passeron 1968/1991: 33-35). It indicates what global PH must act on, what its primary mandate is' (Weir and Mykhalovskiy 2010: 140-1). However, the enrolment of this target into the network was problematised by OH professionals and other KIs: *'I just wish they'd looked at where we'd come from [in terms of previous seasonal immunisation figures]...where do they get that figure from?'.* Furthermore, a KI at LHB A posed the question of how higher uptake rates can be achieved when some resources and a pandemic are no longer enrolled in the network. The same informant proposed that this was a '*politically driven target*' and questioned whether 50% '*of workers want vaccination?';* but some KIs did assert that a target was a useful addition to the network: *'I actually do believe that you do need some level of target because we get complacent if you don't have something to push towards'.* In addition, a KI at LHB B proposed that the motivation of Welsh national-level actants for inserting an immunisation target was ill-conceived:

> *And I think the main central driving pressure came from the political desire...to try and keep their amount of money spent on sickness absence management and people having pay on the sick down to a lower level and that's certainly driven from the Welsh Assembly. I think they got the wrong end of the stick in that one, in that they are using the vaccination or the desire to have high vaccination levels and a desire to keep people, to keep the wages bill down and the bank and agency wages down. And somehow we've missed that opportunity to say well yeah we really do care about you as individuals. So it's come then from the Chief Executive to the Medical Director to*

the Nursing Director. But yeah they've missed the point. A big chunk of absence from work is due to short term virus illness that have nothing do with influenza.

Moreover, both LHBs were not mobilised to the same extent by the target. With a KI at LHB B reporting that they attempted to reach the target; whereas, KIs at LHB A contended that the target was 'in potentia' unattainable. This was transformed into an 'in actu' unattainable target because the LHB had not inserted enough vaccines into their network. A KI also proposed that the mobilisation of a target for frontline HCWs resulted in reduced insertion of seasonal influenza vaccines into HCWs who work night shifts because OH professionals had to restrict their mobile vaccination clinics to the day time. Instead, in 2011-12, LHB A inserted their own, much lower target into the network because they had failed to insert enough vaccines into their LHB to reach the Welsh target. Ultimately the target may have failed to insert the required number of vaccines into frontline HCWs because it remains a target 'in potentia'; it has not been transformed into a target 'in actu' because there are no sanctions for LHBs that do not reach the target.

However, informants proposed that, even in the absence of sanctions for not meeting the target, LHBs strive to 'keep up with the big boys'; thereby, illuminating the power of social norms, 'bandwagoning' (Poland and Jacobson 2001: 2443) and status competition in influencing organizational behaviour (Di Maggio and Powell 1983). Furthermore, sanctions may not be essential to increase uptake. For example, Salgado et al. (2001) found that: 'At the University of Virginia, use of a chart, showing updated healthcare worker compliance

rates with influenza vaccine, posted in frequented areas of the hospital, was partly responsible for increasing vaccination acceptance rates to nearly 70% (Salgado et al. 2001)' (Salgado et al. 2002: 151).

However, even though uptake was higher than the 2010-11 season, none of the LHBs achieved the 50% target in the 2011-12 season; the same target was re-inserted in the 2012-13, 2013-14 and 2014-15 programmes. The insertion of the target also has to be understood in the context of the addition of another actant into the Welsh network in 2011, a 'zero tolerance' approach to healthcare acquired infections[65].

Nevertheless, a KI at LHB A reported that by the 2011-12 season the enrolment of LHBs and the preventative (public) health agenda in the network was having a positive effect on the insertion of influenza vaccines into HCWs. The same KI proposed that LHB A would attempt to insert more vaccines into their network and prepare earlier for the following winter influenza season (i.e. 2012-13).

In addition to inserting a target into the LHBs, KIs at LHB B reported that PHW's role in inserting seasonal influenza vaccines and other hybrid actants into HCWs has increased since the pandemic; but this increased mobilisation has still not been extended to actually administering vaccines to HCWs. PHW's strengths in the network were reported to be in

[65] 'Together for Health: A Five Year Vision of the NHS in Wales' (2011). http://www.wales.nhs.uk/sitesplus/documents/867/111101togetheren.pdf accessed 23/4/13.

mobilising HCWs as vaccinees. Furthermore, the influenza virus has failed, through its effects on and subsequent mobilisation of human actants, to stabilise PHW's enrolment in this immunisation network as other networks in which PHW is embedded compete more successfully for PHW's mobilisation.

Since the pandemic, WG has been mobilised by the H1N1 virus to help insert more seasonal vaccines into the LHBs by keeping stocks of seasonal vaccines and funding the cost of vaccines and vaccinators. However, a KI at LHB B contended that influenza is still not a key actant in WG's network: *'even now the only patients we have to report to WAG now are patients who are in HDU or ITU that have got flu and then any deaths as a consequence of that'.*

Despite the pandemic, then, influenza viruses and vaccines have both failed to stabilise their enrolment in PHW and WG networks. Equally, seasonal influenza vaccines have failed to insert themselves, through the mobilisation of human and other hybrid actants, in sufficient numbers into LHBs and HCWs post-pandemic and have not reached the targets inserted by these devolved national actants in light of 2009-10 H1N1 influenza pandemic. However, in spite of the mild nature of the 2009-10 A(H1N1) influenza virus, pandemic influenza did achieve, through the enrolment of the threat of future, more serious pandemics, its re-insertion into the re-assembled NRR Emergencies as the biggest threat to the UK.

Conclusion

This chapter has considered the journey that influenza vaccines take through the mediation of extended actor-networks (i.e. supra-, sub-, inter- and national actants) to insert themselves into LHBs. I have revealed some of the complexity of the associations in the UK healthcare network, which intersects with the HCW influenza immunisation programme network. Since 1999, the UK healthcare network has been characterised by a single national (i.e. UK) governmental organisation, through the UK DH, while at the same time healthcare services are delivered by four national health services. Decisions about the services to be delivered are taken by the three devolved governments in Wales, Scotland and Northern Ireland, and by the UK Government in England. This is further complicated by UK wide health profession organisations, such as the GMC, British Medical Association (BMA) and NMC. In this chapter I have highlighted the difficulties raised by such a complex, tangled network, particularly during the 2009-10 H1N1 influenza pandemic. This was compounded by the continuing instability of UK healthcare networks, evidenced by the further devolution of healthcare during the pandemic. Changes in the flows of vaccines were entangled in the changes in healthcare networks themselves. This complex network of associations means that it may be more difficult and take more time for influenza vaccines to travel into larger healthcare organisations than in smaller, less complex networks. This was exacerbated by the H1N1 influenza virus itself, whose UK-wide work in the net was not uniform, while pandemic plans largely were. Conversely, however, informants also proposed that during the pandemic the larger UK network helped to insert more vaccines into the four individual networks. Similarly, the larger new LHBs inserted into the Welsh network during the pandemic were also reported by informants to benefit from being a more extended actor-network and from closer

associations with PHW. However, this association was reported to be unstable. Nevertheless, a new actant was inserted into the network post-pandemic by PHW, a 50% target for frontline HCW influenza immunisation. This insertion was challenged by some actants (i.e. by LHB A inserting their own lower target) and the success of the 50% target was questioned by informants working in both LHBs. The same target has been continually re-inserted for the last three influenza seasons, with no LHBs reaching the target (as of September 2015). I asked whether this failure was due to the lack of concomitant sanctions inserted in tandem with the target.

However, the work done by national and supranational actants is only the first step in influenza vaccines' journeys into HCWs. When influenza vaccines have successfully travelled into the LHBs, the next step is for influenza vaccines to mobilise LHB actants to implement an immunisation campaign, the success of which will partly dictate whether HCWs accept influenza vaccination or not. The work of these LHB actants, particularly LHB OH departments, as mediators between the vaccines and HCWs (as acceptors or decliners of the offer of immunisation), is the focus of the next chapter.

Chapter Five

The Journey through Local Health Boards

Introduction

The first empirical chapter traced some of the journey that influenza vaccines can take into LHBs, which is mediated by supra-national and national organisations. However, vaccines still need to enlist LHB actants to create orders so that they can travel into the LHB by crossing the organisational boundary. When, or indeed if, influenza vaccines have successfully travelled into LHBs, it is then, for the most part, the LHB actants, which have to be further mobilised by the vaccines, to mediate the flow of vaccines through these organisations and which partly determine whether the vaccines end up being inserted into HCWs or not.

Influenza vaccines must mobilise LHB actants to do the work of planning and administration, which is mainly done at the LHB-level of social organisation, in order to insert influenza vaccines into the hospital institutions by clinical teams. The vaccines must enlist LHB staff from teams which are made up of heterogeneous actants from OH, Emergency Planning, IPC, PH, Microbiology and clinical hospital departments. These agents are simultaneously actants mobilised in heterogeneous health professional networks; namely Medicine, Nursing and Midwifery.

This second empirical chapter, therefore, examines the journeys that influenza vaccines take into and through LHBs as mediated by LHB actants.

Crossing the Organisational Boundary

In Chapter Four the mobilisation of national-level actants, including UK CMOs, in mediating the flow of influenza vaccines into healthcare organisations was described. Following on from their enrolment in the UK HCW influenza immunisation network in 1999, in 2001, the then Chief Medical, Nursing and Pharmaceutical Officers for England declared, in a letter to NHS organisations, that: 'Responsibility for occupational influenza immunisation rests with the employer and it should be provided through an occupational health service' (Donaldson 2001). This problematisation, and its associated interessement, has resulted in NHS OH staff being enrolled as pivotal actants in the UK HCW influenza immunisation network. From this position, NHS OH staff enrol and mobilise, as agents of the UK and devolved governments, NHS resources and other HCWs. The centrality of OH actants in this network notwithstanding, other multi-disciplinary actants are also enrolled, directly by influenza viruses and vaccines or indirectly through other LHB actants as agents of the viruses and vaccines, to act as enrollers (i.e. vaccination champions).

This first section considers the work that OH and other LHB actants do, when they have themselves been enrolled by influenza vaccines' as their agents, in enrolling and mediating the flow of vaccines through LHBs.

Vaccines, as hybrid actants, can only join the LHB network if they enrol human actants to create orders to purchase them. This LHB human enrolment begins with instructions from a hybrid actant, that itself has already been enrolled by influenza vaccines, i.e. a letter from the CMO,[66] instructing Health Boards/Trusts to decide, through their OH departments, how much vaccine to order and when to order it: 'It is up to individual Trusts/employers to determine their own programme and fund the immunisation of their staff. It is important for Occupational Health services to place orders for the vaccine they need as early as possible' (Donaldson 2001: 4-5). As a result of this letter, influenza vaccines now have the potential to cross the organisational boundary. However, in order to start the journey into and through the LHBs, influenza vaccines still have enrol LHB OH actants to create vaccine orders; and as was explicated in Chapter Four, and shall see later in this chapter, this enrolment is by no means certain. Influenza vaccines encounter a set of pre-existing networks in the LHB, including hospital, departmental and professional networks. These networks have to decide to admit the vaccines.

The first network that the vaccines encounter is the temporarily stabilised budgetary network. LHB human actants, i.e. Medical directors and pharmacists, have to be enrolled by vaccines, in the ordering of influenza vaccines for HCWs. Vaccines must enrol, through OH agents, the LHB Medical Director to sanction the payment and disruption of other networks in which OH are enrolled. A KI at LHB B reported that their Medical Director had been successful enrolled by seasonal vaccines, through the mediation of OH agents, to give

[66] In the example below it is from the then CMO for England.

permission for the vaccines to be ordered, even if it means spending more time and money than is available in the OH Budget:

> *The health board doesn't shout at me for going £21,000 overspent on my budget on flu vaccine. My drugs budget is continuously overspent, and I say "it's for flu", and the Medical Director said to me, "If anybody picks you up on that...please direct them to me". So the health board allows Occupational Health to go a bit behind on its waiting times in order to deliver. So indirectly the health board is very supportive of the flu vaccination programme.*

The same informant stated that the OH nurse, acting as an agent of the vaccine, informs the Medical Director how many vaccines they need for the seasonal HCW influenza immunisation programme, who in turn are indirectly (and possibly directly) mobilised by the vaccine to enrol the LHB pharmacist to physically order the vaccines:

> *We're one of the few health board that's never run out of anything…When we had to order stuff for ourselves then you know we were really well ordered…And we really do plan. We've got a great pharmacy team. When I talked about networks, that's one of the networks again was pharmacy, really good links that we forged. So we all know how much vaccine is available, how much we're using, how much we need to get back in. So you know we've got good at everybody knowing what their area of responsibility was, making sure that the flow of vaccine, the flow of supplies is.*

However, the mobilisation of other LHB actants by the vaccines in mediating the flow of vaccines through the LHB is uncertain, as testified by the previous informant at LHB B: '*How individuals within that I don't know. But the Medical Director, Planning, Infection Control,*

yeah...I don't think they've even begun. I hear a lone voice, I hear the Medical Director'. Furthermore, at the same time, the LHBs are instructed by the CMO that:

> Vaccine for staff should not be obtained at the expense of vaccine for the risk groups. Staff should not be asked to go to their GP for their immunisation unless they fall within one of the recommended high-risk groups, or GPs have been contracted specifically to provide this service (Donaldson 2001: 4-5).

The guidance simultaneously prioritises and de-prioritises the vaccine's enrolment of OH departments, leaving local decision-makers to resolve the conflicting requirements. This double movement, of the government saying that LHBs are responsible for paying for vaccination programme and simultaneously de-prioritising HCWs for vaccination if it is at the expense of other at-risk groups, complexifies the immunisation programme.

In the localities studied, the vaccine seemed to have achieved little attempt by LHB actants to develop an explicit resolution on the enrolment of vaccines. The process by which order levels were determined was reported as being opaque by KIs at both LHBs and was dependent upon and limited by how many HCWs had been enrolled by seasonal influenza vaccines previously, so that the risk of wasting LHB resources was not taken:

> *It's usually taken on last year's figures with a 10% upgrade.*
>
> *Well historically, until this year, that's been done by looking at the previous years', and I mean more than one, uptake and trying to order to a level that you would reasonably predict based on that. So that we don't over order and waste vaccine.*

In addition, another KI at LHB B highlighted the lack of consensus between their LHB and WG over funding for seasonal influenza vaccines: '*…it's quite sad, there have been disputes in the past as to who would actually pay for the vaccinations*'.

This externalisation of the decision-making process around influenza vaccine purchase and the OH department's limited enrolment into the network of decision-making around vaccine orders does not create a strong incentive for LHBs and OH departments to promote vaccination and increase HCW enrolment, as an OH professional testified: '*I don't think there's any more [to be gained] in promoting the seasonal flu* [vaccine], *there's no more that anybody could do with the health board to be honest with you'.*

An OH informant reported that during the pandemic the network was re-assembled by WG, with them being mobilised to take on this ordering role. The informant problematised this:

> *A lot of it was out of our gift. Whereas usually we order our own vaccines, this was coming from central government. The needles, the syringes were coming from central government, so we were waiting for distribution of things that when you're just waiting there with your hands open, waiting to have things delivered to you...*

For the vaccines that have managed to cross the organisational boundary into the LHBs through the enrolment of a hybrid actant, the vaccine order, which as such can be perceived as a LHB passport for these pharmaceutical actants, their task is now to enrol LHB actants further, as vaccinators. The following section considers further the role of OH actants, as agents of influenza vaccines, in facilitating and/or obstructing the flow of vaccines through LHBs into HCWs.

Enrolling Vaccinators

Despite the longevity of this immunisation programme, i.e. since 1999, and the longstanding enrolment of OH actants in the network, KIs at both LHBs reported that, even though they

are key actants within the influenza immunisation programme network, influenza vaccines have only recently enrolled the seasonal immunisation programme as a key actant in the OH staff's own network. When this happened, however, was contested in LHB B. Two KIs reported that this happened further mobilisation began several years before the pandemic: '*probably for the first 10 years...I don't even remember it being significant...I'd say in the last 5 years maybe that's when the flu vaccine has become more of an issue. It was really a take it or leave it';* whereas, a different KI proposed that it was the H1N1 pandemic virus and vaccines that mobilised OH actants further: '*we pootled around, you know, we put a few leaflets out, we kind of "oh you know the vaccine's here", pre [pandemic]...I don't think we were particularly good at advertising it...You know we didn't really go out of our way too much...and then pandemic came'.*

However, OH professionals also reported that since the beginning of their mobilisation into the immunisation programme in 1999, some particular groups of HCWs have always been targeted for enrolment by them, i.e. those working in neo-natal units, ICUs, critical care units, and EDs. OH professionals reported that they had identified the patients in those departments and units as being 'high risk patients' for serious influenza infection and associated complications. The OH actants, therefore, had been more successfully mobilised to facilitate the flow of vaccines in some parts of the network than others.

Furthermore, KIs from LHB B also proposed that pre-pandemic vaccines had struggled to mobilise LHB actants to mediate the vaccines' flow into some hospitals, which may be smaller or more rural, and/or further away from the OH department. This may be a particular issue

in geographically larger and/or more rural LHBs. Mobile vaccination clinics may be less extended in these spaces, i.e. only be available for a more limited duration and range of times, and less stable[67] than at other sites[68]. Processes of inclusion and exclusion are also present in the parts of hospitals that are targeted by mobile vaccination clinics first, as a vaccination champion at LHB B reported: '*we targeted the front end of the hospital where they'd be most vulnerable and um it worked really well so we'll probably do the same next year, as soon as the vaccine comes out; we pre-booked it in August. So we'd, I'd got in touch with Occupational Health and we'd pre-booked clinics*'.

Mobile vaccination clinics can be viewed as allies of influenza vaccines, which go in search of HCWs to target as potential vaccinees, rather than vaccinees having to travel to the vaccines. As I will show throughout the rest of the thesis, these hybrid actants are important in facilitating the flow of vaccines to HCWs.

A KI reported that during the pandemic HCWs at LHB B were prioritised on the basis of whether they provided care for patients, rather than according to the amount of contact, and thus opportunities for infection transmission, they had with them. The informant questioned this policy and also reported that post pandemic this policy has been changed in LHB B:

[67] As HCWs report in Chapter Six.

[68] Chapter Four also considers this issue, though from the point of view of national-level distributors inserting vaccines into these hospitals. Chapter Four reports how seasonal vaccines struggled to travel to these sites but pandemic vaccines did not face the same blockages.

It was about direct patient care and direct patient contact...I think it was probably the same as seasonal flu that if they weren't involved in direct patient care, and that was, it was the wording around direct patient care as opposed to contact because I think contact, they go onto a ward, so you're in contact but you don't deliver care. And delivering care has been the divisive word. So we got that out... You can imagine a porter, he goes up to this ward to collect samples, he goes back down to the lab, he takes his patient to x-ray, then he goes to another ward. He's probably the most peripatetic, diverse little transmitter of virus if we was carrying than somebody who stays in one place. So I just can't get...And they're coughing and spluttering and they're touching them and it's by transmission, so they're coughing into their hands and then pressing the lift button and then they're helping somebody get into a chair to go to x-ray and that's not care?...So it doesn't really make any difference whether you are a porter or a domestic in clinical services you're still having patient contact. Therefore, just vaccinate them.

The same informant reported that prior to the 2009-10 pandemic, some frontline HCWs were prioritised for seasonal influenza immunisation over other frontline HCWs and that this was dependent on the OH department's analysis of which frontline HCWs' roles were more 'critical' than others:

in previous years we'd always stuck very closely to at least this person prioritised within the health board's employees needs to have a flu vaccination. Because even within the sort of clinical contact people there was a case of well someone who is working in an intensive care unit is probably going to be more important to vaccinate than someone perhaps who works in the care of the elderly day centre. They're both doing a clinical

> *role but one has a more critical role. Firstly, if you try to back fill an intensive care nurse it may be more difficult to back fill than someone's who doing a care of the elderly clinic...historically there'd always been a pattern that there was prioritisation to clinical staff and you don't actually worry that much about whether the non-clinical people are vaccinated because they were perceived as being at lower risk. But even within the clinical group there was this differentiation…and there were occasions when people previously had been turned away.*

This was in contrast with the 2009-10 pandemic when prioritisation between different clinical specialties was not carried out, as the same informant asserted: '*But particularly that year, no there were no problems. Basically, if you were a clinician person on this health board probably you got vaccinated'.*

Therefore, there are processes of inclusion at work in the administration of the immunisation programme which facilitate the flow of vaccines into some spaces. These stabilised associations between OH professionals and targeted departments/hospitals may also be exclusionary and could mean that influenza vaccines have failed to mobilise LHB actants to mediate their flow to or limited their flow into other spaces, i.e. departments where patients are not perceived as being at such high risk[69].

Even though the prioritisation and privileging of particular departments and/or hospitals is not sanctioned officially, this annually repeated prioritisation behaviour by OH actants,

[69] See Chapter Seven for ethical issues associated with this.

stabilised by habit and social and historical associations may act to both facilitate the flows of vaccines in some of the LHB network and stem it in others. The repetition of this situation suggests that HCWs in these unprioritised spaces being relatively unempowered to contest these stabilised norms of behaviour.

Part of the explanation for the failure of pre-pandemic seasonal influenza vaccines to enrol OH agents, as vaccinators, could be the fact that this annually repeated[70] mobilisation has generated a variety of challenges, some arising from conflicts with the enrolment of OH staff in other networks with other requirements and some from the enrolment of other actants with divergent goals or motivations. Hospital OH departments are also enrolled in the following networks (amongst others): other immunisations (e.g. Hepatitis B Virus (HBV) and Bacillus Calmette-Guérin (BCG)); staff screening (e.g. Tuberculosis (TB), Methicillin Resistant Staphlycoccus Aureus (MRSA)); management of sharps incidents; musculoskeletal disorders; and, inoculation injuries.

The material and organisational structures of the Welsh OH network may also work to obstruct the flow of vaccines into LHBs. The work of these LHB actants is dependent upon what resources, in terms of OH services, have been inserted into the LHBs by national-level actants, the UK, and more recently, WG, as conveyed by a KI at LHB A:

> *England has very different structures and has invested in a very different way in the last 20 years and whether you've ended up with more resources around some things*

[70] It is important to note that only influenza vaccines demand this annual repeated mobilisation. Other vaccines either do not have to be repeated or only at intervals of several years.

compared to Wales. We're at present in Wales we've got a very patchy Occupational Health Service, I'm talking across Wales and even within the health board we've got a very scarce resource. And certainly if England have succeeded in investing in a better way in Occupational Health and it might be they can deliver aspects of programmes like this better...And I don't know if because of their structures if they've been able to mandate in a different way.

Midwives in LHB B taking part in a focus group agreed that OH services, at least in their LHB, are inadequate:

P1: Occupational Health, well within our health board, is in another hospital.

P2: And there's a six week waiting list to go to see them.

P1: Yeah. And it's, I have never in twenty five years used it...Yes I refer staff...if they refer themselves at the moment, it's quicker than if a manager refers. So there is a big wait there, it's not that accessible, it's off another site. Um and I think that's why people turn to their GPs really.

Could this perception of OH services by non-OH LHB staff also affect attendance at OH departments for influenza vaccination? That is because ultimately, the immunisation programme requires vaccinators to create a stable network that brings together a hybrid actant, the vaccine, and human actants, vaccinators and willing frontline HCWs as vaccinees, in the same place at the same time. The first challenge is for vaccines to mobilise vaccinators themselves. Participants' accounts conveyed that pre-pandemic vaccines had failed to sufficiently mobilise some vaccinators. KIs at both LHBs reported that some OH staff are clearly ambivalent about the HCW immunisation programme as vaccinees themselves and

that this may have a negative effect on them acting as mobilisers of other HCWs as vaccinees. However, OH agency is limited because they have to vaccinate, even if they are non-vaccinees. It is also limited by their enrolment in other engagements.

OH staff are not the only HCWs who act as vaccinators in the network but they are important actants in terms of delivering and organising the immunisation programme. In particular, it is essential for vaccines to mobilise OH nurses. They are currently obligatory passage points in the network, because they have a major role within the department in determining the planning, timing and delivery of vaccination campaigns, which are locally, not nationally mandated decisions. An OH informant reported that these decisions are dependent upon several factors: '*how the progress has been made in advising people about the campaign, supply of vaccines, staffing levels within occupational health'.*

However, the mobilisation of OH nurses to immunise in HCW vaccination campaigns was problematised by a KI at LHB B:

> *is that an effective use of senior nurse practitioner time because vaccinations can be administered by a band 5 nurse which costs a fraction of a band 7, band 8. A band 7, band 8 nurse will be doing other skills, whereas the band 5 nurse will only vaccinate. And some of the sort of team talk recently has been "well if we have a concerted push on vaccination should we just call in agency staff to be able to vaccinate, that's their set purpose they get through as many as they can". There were cost constraints on that and the idea was quashed. But in reality if you look at it from a slightly different perspective, yeah it may cost a bit more money but you're actually having a very big*

positive win, lots of people should be vaccinated because you're more freely available. But on the other hand your existing staff will be able to carry on with their normal work.

The use of the term 'normal work' by this informant presents the vaccination programme as something abnormal, in tension with the 'proper work' of the OH department. Another OH informant contrasted the programme with their department's 'necessary work'.

The same KI drew attention to the role of a hybrid actant, an immutable mobile, the Patient Group Directive (PGD)[71], in destabilising the nurses' contribution to the vaccine network:

the difficulty with looking at nurses delivering the front end of the service is that they will not go outside the constraints of that PGD. If they do the concern is well we would not be covered by our professional body, be it the Nursing or Midwifery Council. We may not be covered by litigation liability from the trust if that person keeled over and was ill. So having very tight criteria and playing by the rules as they had been written, and it being driven by nurses meant that you wouldn't do it. If we wanted someone to have a vaccination who is not in that Patient Group Directive then...a medic...would write a separate prescription and do it without any particular problems.

However, a KI at LHB A proposed that PGDs are in fact important mediators, working, like an export licence, to facilitate the flow of influenza vaccines through non-medical HCWs as vaccinators:

[71] A Patient Group Direction (PGD) or Patient Specific Direction (PSD) are legal documents which allow qualified health professionals, who are unable to write prescriptions, to supply and/or administer Prescription Only Medicines (POMs) and Black Triangle Vaccines (in certain circumstances) (DH 2000). Also, 'PGDs are defined as written instructions for the supply or administration of medicines to groups of patients who may not be individually identified before presentation for treatment (SI 2000/1917)' Salisbury, Ramsay and Noakes, 2006: 35).

> *we've got a lot of back up from the PGDs that they produce with the vaccine. Because when you have a Patient Group Directive, you don't have to have an official prescription from the Occ Health doctor. You do your consent, they sign the consent, and then you give the vaccine provided you're a competent person. And I think that has allowed us to do a lot as well.*

The PGD is an important hybrid actant in the network, because while OH nurses are obligatory passage points in the network, OH doctors are not mobilised to the same extent by influenza vaccines in the immunisation programme.

However, some OH doctors are mobilised to a greater extent in this network than others; with one of the OH doctors interviewed participating in the administration of the pandemic influenza vaccination to HCWs, whereas their counterpart did not. A KI proposed that the more active enrolment of the OH Director in LHB B's HCW influenza immunisation network (during the 2009-10 pandemic) helped to achieve greater mobilisation of HCWs as vaccinees and therefore higher uptake of the pandemic vaccine.

A KI at LHB A also reported that an OH assistant has been enrolled to hasten the flow of vaccines into HCWs, and a KI at LHB B similarly recounted that PHW staff help, by completing immunisation paper work with the vaccinees while they are waiting to be vaccinated. This means that both the vaccinee and vaccinator does not have to use additional time to complete the administrative work, the vaccinator can concentrate on vaccinating and the potential vaccinee has less chance to reject mobilisation:

therefore people weren't waiting long and if they were waiting someone was chatting to them and asking them things and whatever so they didn't feel it was a wasted space or they didn't have a chance to run off again, you know [both laugh]. 'You've pitched up so you're not going anywhere now', so.

The level of OH staff mobilisation is currently critical to the stabilisation and performance of vaccination network. Some staff are constrained by the actions of other agents like the PGD. There is competition from the claims of other networks in which staff are enrolled: campaign timing, for example, can be affected by OH staff annual leave plans. Finally, there is competition from the 'normal' or 'necessary' work of the OH department, where staff do not share others' views of the priority to be given to vaccination relative to other claims on their time and resources.

In addition to being mobilised to vaccinate HCWs, OH actants (usually OH nurses) are also mobilised in taking part in knowledge practices in the network. They have to record[72] and send to Public Health Wales (PHW) an immutable mobile '…of staff immunised and monitor the effectiveness of their programme' (Donaldson 2001: 4-5). The record of uptake, as an administrative artefact, is a representational tool in the immunisation programme.

This knowledge practice was complexified and problematised (in terms of the time taken to do it) by OH actants. These reporting requirements, coming in from accountability, quality assurance and financial audit networks, rather than IPC networks, compete with vaccine

[72] Recording vaccine uptake is also considered in Chapters One and Eight.

delivery for finite OH time. The accuracy of data sent by the LHBs to PHW and the role of PHW in reporting the data sent by the LHBs was also problematised by KIs at both LHBs[73]. This part of the role was also further complicated (at least until the 2013-14 season) by HCWs who are also enrolled in an influenza risk group network and receive their influenza vaccinations from GPs. They were therefore not included in the LHBs' uptake figures and this led to an understated representation of the level of LHB HCWs' influenza immunisation.

Therefore, measuring influenza immunisation coverage or uptake rates among HCWs is not a straightforward issue (Quach et al. 2013). Furthermore, tracking who works for an organization, and who should be and who has been immunised, can be difficult to achieve (Pezzoli et al. 2010). For example, definitions of HCW and frontline HCW may vary in different organisations and countries. This is exacerbated by mistakes which can be made in numerator and denominator data (Russell and Henderson 2003), and other accuracy and completeness issues (Quach et al. 2013). Additionally, Bish et al. (2010a: 8) point out that 'Comparisons of data across studies need to recognise the many differences in contexts'; for example, across countries, seasons and influenza (seasonal, epidemic and pandemic). It is also difficult to be certain if HCWs received influenza immunisation from another source, for example, from their general practitioner, which could have resulted in an underestimation of uptake and unfair comparisons being made. Furthermore, a KI at LHB B reported that in previous seasons there had been an issue with vaccination champion vaccinating figures not being included in the LHB statistics.

[73] Of course, record-keeping always includes the potential for non-accurate data to be recorded.

Measuring uptake of HCW influenza immunisation is important because as Lindley et al. (2009: 1155) proposes: 'It is often said, in public health as in other areas, that what gets measured, gets done…Of equal importance to the fact of measurement itself are the methods used for measurement (i.e., the measurement practices)'. As was mentioned earlier in the chapter, uptake figures are used to guide decisions around future vaccination ordering. So not only does the artefact record (or at least purport to) previous successful mobilisation of HCWs as vaccinees, and as vaccinators, but it both facilitates and blocks the flow of vaccines in future seasons, by ensuring that sufficient vaccines are ordered to vaccinate at least as many HCWs as in previous years, while limiting future orders to levels not far above previous uptake. This role of uptake figures was vastly increased during the pandemic, from yearly feedback by LHBs in seasonal programmes, to weekly feedback during the pandemic, in order to facilitate the flow of more vaccines into the LHBs.

Record keeping and reporting take on even more significance where a target has been inserted into the network. Achieved (or not achieved) targets are gathered from the micro (i.e. departmental, professional and hospital) level, and aggregated, collated and reassembled at the 'meso' (i.e. LHB) and 'macro' (i.e. Wales) levels (Coutinho, Bisht and Raje 2000). However, the targets and uptake aggregates blackbox and mask differences in immunisation coverage in different departments, professions and hospitals. Uptake figures are a proxy measure for how protected staff and patients are against influenza; but if non-frontline staff, medical students and non-HCWs who are sometimes present in these departments are not vaccinated then the figures mask this lack of protection. This could lead to local outbreaks if insufficient HCWs are vaccinated, i.e. to achieve herd immunity (whatever that may be).

While disguising differences, uptake figures, nevertheless, make visible a LHB's success or failure in meeting the target. This visibility results in more actants being enrolled into the network in order to increase uptake in future seasons.

A KI at LHB highlighted that a target also works to compete with other networks in which OH are enrolled:

> *I suppose one of the concerns of the 2011, 2012 campaign was there was an expectation of a minimum of 50% uptake of all employees; possibly as high as 75% and that was still falling far short of the Public Health expectation that we should be doing 85, 90%. Umm and it's, the concern was if we're going to push to that level we would need to be spending much more time and almost saying we're not going to be doing any of the routine work. Umm and it's a possible thought for the future, Ok do you say we put an embargo on routine work for 1 month and just push the opportunity over as many sites as you can.*

Another monitoring system present in this network is the 'yellow card system', whereby adverse events from vaccination are recorded and reported. Such reporting systems are important because they can work to divert vaccinees' negative opinions of vaccines away from potential vaccinees (Calain 2007; Roalkvam et al. 2013; Yaqub et al. 2014). However, KIs reported that this reporting system is underutilised in the LHBs.

Furthermore, unlike other immunisations, HCWs are not asked to declare influenza immunisation status on OH forms when starting to work for a healthcare organisation. The

insertion of this immutable mobile into all departments may be able to mobilise HCWs as influenza vaccinees by highlighting its importance and by reminding them to accept annual immunisation. However, informants reported that on some wards, such as intensive care, there is an informal declaration inserted into their network, thereby making immunisation in effect mandatory in those locations. Mandatory vaccination socially exists in these departments without the necessity of official written rules or laws. Similarly, Cloatre (2014: 98) found that patents 'socially exist[s] independently from any written rule'.

Despite the difficulties in mediating the delivery of vaccines and recording uptake, some staff do succeed in 'black-boxing', or stabilising, their role in the HCW influenza immunisation programme: '*We like the flu campaign because we know exactly what we've got to deal with, when it is, the timescale we've got to get them out and the satisfaction we get then because you know when we see our cohort and you see this heck of a list of people you vaccinated*'.

However, could the above quote be interpreted as illustrating complacency with current achieved HCW uptake? Furthermore, mobilisation of the OH department's staff does not ensure that the vaccine and the frontline HCWs will be united. Once vaccines and vaccinators have been mobilised in the network, the next step in the vaccine's journey is to enrol and mobilise HCWs as vaccinees. The next section considers how HCWs are enrolled and mobilised as vaccinees by vaccinators and vaccination champions enrolled as agents of influenza vaccines in the immunisation programme.

Enrolling HCWs as Vaccinees and Vaccination Champions

The relational ontology of the vaccination programme network defines HCWs simultaneously as 'consumers', choosing to go to their OH department or a mobile vaccination clinic to be vaccinated every year, and as 'recipients', who need to be encouraged by OH and non-OH staff, and by hybrid actants such as posters, leaflets and staff intranet announcements, to attend for, and accept, influenza vaccination.

In much the same way as Singleton and Michael (1993: 234) said of GPs in their role in the Cervical Screening Programme (CSP), 'ambivalence and the dual status of insider and outsider at once sustains and subverts that [OH] network'. OH staff are insiders as HCWs and LHB staff themselves, and as potential vaccinees; and they are outsiders in that they are not working with members of the public as the other LHB HCWs do, but with HCWs as their clients/patients. OH staff also have a surveillance role and can approve or disapprove LHB staffs claims for sickness leave, may 'bully', 'coerce' and 'interrogate' HCWs who refuse vaccination[74], and also keep records of who has, and has not, accepted vaccination.

OH staff problematise, de-problematise, 'complexify' and 'black-box' the HCW influenza immunisation programme. One way in which OH staff problematise and complexify the programme is by emphasising that their role requires skill in persuading HCWs to accept vaccination. Like pharmacy, 'Counselling is a significant area of autonomy in [vaccinating] work' (Dingwall and Wilson 1995: 121)…counselling in the sense of giving information or

[74] This will be considered later in this chapter and in Chapter Six.

advice about the use of the [vaccination] rather than with any psychotherapeutic connotation (Sitkin and Sutcliffe 1991)' (Dingwall and Wilson 1995: 119).

However, there are also disciplinary aspects to this counselling role. OH staff problematised their own role in enrolling HCWs by persuading them to accept vaccination: '*You've got to be assertive with them you know and I think it gives them the impression then that either, you know, we bully them or we really care about the staff and we do, we care about the staff, we don't want them to be ill'.* Similarly, OH staff complexified their role as vaccination enrollers:

> *I'm trying to sell patient, self and family but I think it's family, self, patient. So we started to change our tack and go "cover yourself". I mean I've always had the emotional blackmail but we started to change our tack to fit in with what we were sensing was what's most important to this person.*

While these two quotes portray OH staff as caring health professionals concerned about the health of their HCW clients[75], they also exhibit concern about being perceived to use bullying or blackmail to achieve HCW enrolment in the vaccination programme[76]. In fact, some OH professionals and vaccination champions reported that HCWs had accused them of bullying them about accepting influenza vaccinations. At what point does the encouragement of consumers to be recipients spill into coercion, with the risk of disrupting the network's ontology and staunching the flow of vaccines?

[75] It is important to remember that HCWs as potential recipients of influenza vaccination in this programme are healthy clients, rather than ill patients. A point which is emphasised further in Chapter Six in the accounts of midwives talking about their pregnant women clients.
[76] The bioethics around such bullying/coercion/blackmail will be discussed in Chapter Seven.

Vaccinators are not just intermediaries between vaccine and vaccinee, nor just a source of information only, and non-medical vaccinators are not just intermediaries of the PGD; they are mediators. As is elucidated in this chapter, however, sometimes this mediating role is not achieved due to competing pressures for vaccinators' mobilisation. Furthermore, OH informants proposed that some vaccinators (i.e. OH nurses and doctors) are more successful than others (i.e. non-OH vaccination champions).

This is compounded by the frequent need to enrol and mobilise 'at a distance' because OH staff have limited direct engagement with frontline HCWs. OH staff must first enrol a variety of intermediaries and mediators, who are themselves subject to competing network claims and who may not necessarily appreciate the vaccine programme's complex relational ontology. OH staff enrol other HCWs to help promote the HCW influenza vaccination but this enrolment is problematised by OH staff:

> *You can email the heads of department, cover community, speech and language, occupational therapy; it's down to the heads of department then to get that message out to their staff you know. And we don't have any messages back; you know we don't have the managers feeding back to us to say they can't get hold of such and such. We're relying on managers to actually get it out to staff you know.*

In particular, the central position of the Director of Nursing and other senior nurses in enrolling other HCWs into the network as vaccine acceptors and as vaccination champions was emphasised by OH professionals. However, some OH professionals also reported that

some nurse Managers, have yet to be enrolled as mobilisers in the network. Furthermore, some OH departments enrol specific vaccination champions, usually nurses or midwives working in other departments, to help encourage and/or administer HCW influenza vaccinations. However, some OH professionals reported that some senior nurse managers have actively worked to stop nurses acting as vaccinators due to time pressures. A Nurse Manager at LHB B proposed and problematised that nurses working as vaccination champions could by extension lead to further expectations of non-OH nurses doing OH work on wards and that time spent vaccinating colleagues is time not being given to patients.

A vaccination champion also identified the Immunisation Co-ordinator from the LHB IPC Department and OH professionals to be key actants in the network, providing crucial support, information and training for vaccination champions. She reported that this was important because of her lack of knowledge of the immunisation programme, compared to OH professionals. Yaqub et al. (2014) also found that healthcare professionals reported similar deficiencies and that this can have implications for the trust felt by potential vaccinees for vaccinators.

The complexification of the OH role simultaneously serves to call into question the persuasive skills of non-OH staff. However, the previous vaccination champion at LHB B stated that she felt colleagues were more likely to accept vaccination from a colleague than from an OH professional because they trusted her judgement in promoting influenza vaccines, and that she was approachable and accessible to ask any questions to. She also proposed that her long

experience as a HCW in that particular department and good relationship with colleagues increased her perceived trustworthiness. Even an OH informant agreed that vaccination champions can sometimes be more successful than OH actants in mobilising HCWs as vaccinees, particularly if they are from the same profession: '*But to have a midwife vaccinating midwives improved the uptake. A she was accessible and B you know she sent out a really positive message*'. A KI at LHB B agreed that mobilising a midwife as a vaccination champion was important during the pandemic programme, particularly in terms of persuading colleagues of the necessity of vaccination: '*we just felt that it was poignant for our service that we had somebody to actually ensure that midwives understood the importance of being vaccinated and also ensure the importance of delivering that message to the [pregnant] women*'. This informant seems to be proposing, like Hobson-West (2005: 98), in her study of parents' resistance to their children receiving MMR vaccination, that:

> In terms of vaccination, then, resistance can be explained as resulting from a lack of trust in the professions that are responsible for its administration and promotion. Research in Science and Technology Studies is helpful here, in demonstrating that messages are judged primarily not by content but by source - *'who is telling me and can I trust them?'* (Bennett and Calman, 1999, p. 4 and see Wynne, 1993).

What does this mean for HCWs who are being asked to accept vaccination by other HCWs? Does this mean that there is a lack of professional trust between OH and non-OH professionals[77], and subsequent failure to mobilise HCWs as vaccinees?

[77] This issue will be considered in Chapter Six.

Furthermore, the vaccination champion also complexified her role in enrolling and mobilising other HCWs into the network:

> *You've got to have somebody who's enthusiastic I think, with sort of quite willing to say "well come on, you need to think about, you need to try and address this". Not bully people but get people to address it. Nobody likes to think about having an injection do they?...I do believe my attitude to the staff helped as well 'cos I was trying to be positive about it rather than negative about it...I seem to have a little way of doing it.*

This vaccination champion also seems to be aware of the dangers of bullying to the network's relational ontology.

Key and non-KIs at LHB B also put forward that charisma, rather than seniority, is an important quality for vaccination champions to have. These views correspond with other studies (e.g. Damschroder et al. 2009) about IPC champions, which have also found that individual appeal, such as enthusiasm, is an important attribute. This mediation of vaccines by vaccination champions, therefore, may be of a different order to that of OH doctors, which was considered earlier in the chapter. While doctors may mobilise HCWs as vaccinees through their relative position of power, vaccination champions utilise their equal (or subservient) position as a non-medical HCW in the same department and longevity of associations.

In addition, the vaccination champion proposed that her immunisation programme was so successful because she was more easily accessible to the HCWs who worked in the same

department as her; both in terms of physical location, visibility (facilitated by wearing a yellow vaccination t-shirt) and the times in which she was available to vaccinate and counsel her colleagues. She also reported that the geographical proximity of her immunisation service is an important factor for her department (which is very busy) and professional groups (whose work is unpredictable). OH professionals agreed that attending vaccination clinics at the OH departments was a significant barrier to uptake and that this was exacerbated by problems with car parking when attending the OH departments.

The champion also reported that she keeps a list of HCWs she has vaccinated so that she can opportunistically target those that she hasn't vaccinated (for example, with immutable mobiles such as leaflets) and keep her colleagues aware of the vaccination programme through her physical presence; something which OH departments are unable to do due to the amount of HCWs that they would have to track of and the other calls on their time. Furthermore, the vaccination champion argued that local knowledge of colleagues' shift patterns allowed her to target unvaccinated HCWs and that in future she would target a hard-to-reach group of HCWs, i.e. community midwives[78]. The different 'method of monitoring [by OH and vaccination champions] is embedded in a specific configuration of tools, knowledge and actors' (Schubert 2012: 124). The vaccination champion, therefore, 'has a crucial role as a mediator between the bland computer record and his or her knowledge of the social geography of the community…This social dimension is latent in the database and can only be mobilized by someone licensed to read it in an appropriate fashion' (Dingwall and Wilson 1995: 119). However, a KI at LHB B problematised the enrolment of nurse managers as

[78] This group are also considered in Chapter Six.

vaccinators in terms of keeping track of who had vaccinated who: '*So while the idea of having the ward managers trained is great, but the systems need to be robust to keep a track of who's recording that data*'.

Furthermore, the use of vaccination champions was reported by OH informants to be a problem for the network because of the lack of control over their relationship with hybrid actants recruited by the OH department (e.g. influenza vaccines and fridges)[79]; OH staff are required to keep legal responsibility, 'at a distance', for the cold chain even when vaccination champions in fact have physical safekeeping of the vaccines. Therefore, it is not sufficient that influenza vaccines travel to their targets; instead, they must travel in a particular way, i.e. at a particular temperature, in order to successfully create an immune response in the vaccinee.

In addition, a vaccination champion at LHB B reported that her mobilisation has not been stabilised. The instability of this part of the network is increased by the personal characteristics and enthusiasm for the programme, and experience of persuading and skilfully vaccinating, that are necessary for vaccination champions to facilitate the flow of vaccines into their colleagues because they may not easily be replaced by other HCWs who have been compelled to take up the role.

[79] The work of vaccination champions during and post pandemic will be considered later in the chapter, and in Chapter Six.

Therefore, the mobilisation of non-OH staff as vaccinators can be perceived as a site of contestation and instability for the network. The enrolment of frontline HCWs into the vaccination network lies, then, at the end of an uncertain and fragile chain of actants and relationships. Complexity is further increased by the rationing of vaccination[80], which restricts enrolment to those frontline HCWs directly employed by the health boards. OH and non-OH staff are challenged to stabilise the network by mediating between the vaccine, policy documents governing its usage, and potential vaccinees, whose eligibility for enrolment ultimately turns on practical local decisions about the fit between these three agents. The enrolment of HCWs as vaccinators and vaccinees is no more certain or stable than that of vaccines.

Pandemic Influenza Vaccines' Journeys through Local Health Boards

Having considered the journey that seasonal, and to some extent pandemic, influenza vaccines take through LHBs, I now consider the unique features of the H1N1 pandemic vaccine journey.

NHS OH departments were enrolled into the pandemic influenza HCW immunisation programme partly by UK-wide actants, first mentioned in Chapter Four, who of course had themselves been enrolled by the H1N1 virus and pandemic influenza vaccines: 'The four health ministers...noted that a variety of mechanisms to deliver the vaccine would be appropriate, including...occupational health services' (Hine 2010: 38).

[80] The rationing of vaccination will be considered further in Chapter Seven.

Several KIs used terms such as chaos, crisis, panic and fear to describe their initial reactions to the 2009-10 A(H1N1) influenza pandemic and their forthcoming HCW influenza immunisation campaigns. However, a KI at LHB B also reported that despite being *'initially overwhelmed...by the stampede of the eager...the organisation pulled together...our fears were unfounded really'*. This was partly because, as asserted by the same KI, new LHB human actants, as vaccination champions, had been enrolled and mobilised into the pandemic network. The H1N1 virus forced LHBs to re-consider and extend existing immunisation networks, both in terms of mobilising more human actants and extending the geographical spaces in which the network operated.

In addition, to more human actants, a KI proposed that the introduction of an immutable mobile into the network at LHB B also helped with the OH role as information givers and enrollers during the pandemic: '*In the end we published the 10 most common questions to try and head people off at the pass...we put that on the intranet and we also took them with us, so while people were waiting we had information sheets there'.* These hybrid actants performed roles that enabled OH staff to concentrate on their role as vaccinator and not as information giver/counsellor. Since this information receipt occurred while HCWs were waiting to be vaccinated, these hybrid actants served to doubly fold time; saving the time of both vaccinators and vaccinated. While this immutable mobile did not travel far, i.e. only within the LHB, and often only from the OH department immunisation room to the waiting room, this was still far enough for it to mobilise vaccinees in a way that the human actants did not have sufficient time to do. A KI reported that lack of time for OH professional to

counsel potential vaccinees during the pandemic could have served to block the flow of vaccines in LHB B:

> *sometimes when there's a lot of people to get through and you haven't got that much time, the nursing teams would not have been spending that much time to talk through the issues with them, "what are your concerns?"...And I think my involvement, I was actually prepared to sit down and talk to people. Ok that contact with me took longer but the expectation was that you'd go away with two painful arms rather than one. So that was helpful.*

There was a consensus amongst KIs that HCW vaccination was the most important IPC measure for LHB staff against pandemic influenza:

> *Immunisation was clearly a major sort of backdrop of a protective measure...very few antivirals were actually prescribed by us occupational health to staff; although that had figured as quite a significant part of the pandemic flu planning. Had it proceeded it in different ways you know, so; but in the event it was not a big factor.*

In fact, some informants proposed that the side-effects suffered by patients from anti-viral medication actually encouraged HCWs to accept pandemic influenza vaccination rather than taking anti-viral medication. Another IPC measure was also widely problematized. This was the training, fitting, effectiveness, usability and availability of the non-human actants in the form of personal protective equipment (PPE), respiratory masks, for HCWs in both LHBs. Therefore, the failures of these 'alternative technologies of order' (Dingwall and Wilson 1995: 122), in fact succeeded in stopping the transmission of H1N1 into HCWs. However, this was not through direct means, but through their association with vaccines as being more effective

than they were themselves. The interessement of HCWs into the pandemic immunisation programme was negotiated in a context where alternatives existed that became more or less attractive depending on what the immunisation programme had to offer, or at least what it was perceived to offer, compared to what the alternatives had to offer (Cloatre 2014).

However, despite experiencing the same pandemic in the same nation, the two LHBs reported different levels of vaccine uptake to each other and the opposite profile to their seasonal uptake during the pandemic and the following winter influenza season[81]. The differing profiles of HCW pandemic influenza vaccine uptake by the two LHBs was explained by informants through several factors. LHB A inserted into their network a countdown from August 2009 to the start of their pandemic campaign in October 2009, which was mobilised using immutable mobiles, posters and intranet announcements; whereas LHB B focussed on how they would insert the pandemic vaccines into the HCWs; but influenza vaccines can only flow into HCWs if they have been enrolled into the network (e.g. through a countdown) and are then mobilised to accept the vaccine. The countdown worked by folding time, bringing the pandemic vaccines temporally closer to potential vaccinees by entering the knowledge assemblage of the HCWs earlier and mobilising HCWs in advance of the start of the pandemic immunisation programme. In addition to having no countdown, some KIs at LHB B perceived that their pandemic programme was mobilised late (compared to other LHBs and Trusts) and that this was exacerbated by their geographical position[82]; that is, their proximity to a

[81] These differing profiles are outlined in Chapter Three.

[82] It is important to note that ANT encourages care to be taken when attaching importance to Euclidian geography in networks. Physical location may not be important in a network; the relative importance of associations between actants in the network are not always related by their physical proximity. In this study, however, informants have proposed that physical proximity, in terms of the LHBs' geographical position, and

motorway and in so far as they are closer than LHB A to England (where more H1N1 had travelled to and also arrived there sooner than in Wales) which meant that H1N1 travelled to their LHB faster and so they had their first cases of H1N1 earlier than other Welsh LHBs.

Furthermore, KIs at LHB B also reported that their seasonal immunisation programme was mobilised during the pandemic before the pandemic immunisation programme and that in effect this doubled their workload[83]. Therefore in LHB B, seasonal vaccines started to flow into the pandemic network in advance of the pandemic vaccines, whereas the pandemic vaccines did not start to flow into the pandemic network until the virus had also started to flow into the LHB network. I would argue that this was further exacerbated by the fact that enrolment of vaccinees continued 'at a distance', with mobile vaccination clinics being under mobilised and OH enrolment in them voluntary, unlike at LHB A[84]. A KI at LHB B also reported that during the pandemic there was a lack of '*clarity of which group should we be targeting. Umm and that changed as we went through the campaign*'. Of course, this would have an impact on when and to who pandemic vaccines could travel.

the use of mobile vaccinations clinics are important factors. Again this is because you have to be physically close to an influenza virus to catch it and to an influenza vaccine to receive it.

[83] A presenter at a pandemic influenza symposium proposed that a seasonal influenza immunisation programme should not be run during an influenza pandemic, due to the extra work required to administer two programmes in one influenza season and given that there may be relatively low amounts of seasonal influenza circulating during a pandemic. It also means that recipients have one sore arm and one set of side-effects to contend with rather than two. I would argue, however, that it may be a missed opportunity to mobilise HCWs as seasonal vaccinees and that the extra time of administering a second vaccination is relatively negligible because HCWs only have to queue once and wait for twenty minutes after for both vaccines.

[84] LHB A was commended as an organisation in Wales for their HCW pandemic influenza immunisation campaign. This was achieved in spite of a large amount of snow and an outbreak of norovirus affecting the LHB at the same time during the pandemic campaign.

Informants also reported that the geographical location of OH department based vaccination clinics was an issue for both LHBs during the pandemic and that this was exacerbated by hybrid actants, such as a lack of parking at the OH unit based at an off-site hospital in LHB B and parking charges at the hospital being considered in LHB A. HCWs, literally, failed to travel to meet the H1N1 vaccines at the OH department pandemic vaccination clinics. This highlights the 'Spatial dimension of agency' (Passoth, Peuker and Schillmeier 2012: 7), where actants' motilities are constrained by hybrid actants, i.e. car parks.

This spatial dimension of networks can also refer to the space present within networks (i.e. size of LHBs) that vaccines have to travel through, rather than the space through which human actants navigate. For example, a KI at LHB A proposed that the geographical properties of their organisation, in terms of proximity of enrolment, i.e. the vaccines had less far to travel, to be a factor in their more successful pandemic campaign. However, whether it is vaccines or HCWs that fail to travel, the result is the same: they fail to meet and vaccination is not achieved.

In addition, informants at LHB B reported that pandemic vaccines struggled to flow through some parts of the network. For example, a KI proposed that vaccine distributors were less successful in inserting the vaccines into smaller institutions as opposed to larger hospitals. However, a midwife at LHB B reported that during the pandemic campaign influenza vaccines had been successfully inserted into rural hospitals.

The 2009-10 influenza A(H1N1) pandemic was reported by OH professionals to be a pivotal moment in the HCW influenza immunisation programme actor-network: '*pandemic was kind of like a line if you like to be crossed...the improvement was vertical during the pandemic and we've tried to keep that and build on it'.* OH staff 'are simultaneously black-boxed simplified entities within the' HCW influenza immunisation programme, 'and complex multiple [decentred] identities that exist [and move about] both inside and outside the programme' (Singleton and Michael, 1993: 256). The HCW influenza immunisation programme network is described by OH staff as a small engagement compared with their roles in other networks - carrying out new entrant screening, staff sickness absence returns, health promotion and other vaccinations, such as HBV. However, during the 2009-10 pandemic, more active mobilisation was demanded:

> *There was an acceptance that there would be perhaps delays if you like or that would have an adverse effect on some of the other things we do and even some things would stop whilst those services were being delivered, more so than happens in a seasonal campaign...we didn't do any health promotion work during the pandemic flu that I can recall. And there would be some delays on perhaps...new entrant health screening. I don't think there were any delays that I know of caused any significant operational problems. But, and routine immunisation programmes were also delayed a bit as well…We had to take it right through to the February, whereas normally the end of December would be the finish of our seasonal vaccines, we continued through to February.*

In addition, as outlined earlier in this chapter, the OH doctor at LHB B was mobilised by the pandemic virus and vaccines to do work as a vaccinator.

This more active mobilisation was necessary because the 2009-10 pandemic immunisation programme accentuated the challenges of the seasonal programmes; as an OH Professional proposed: '*It was a significant burden really on our resources in so far as particularly it tied up a lot of nursing resource, both in the planning and the execution of the campaign'.* Another OH Professional went further, to suggest that the HCW pandemic influenza campaign:

> *needs to be not seen as an Occupational Health focused um problem, for want of a better word. It's almost as though vaccination equals Occupational Health in the months of October, November, December...the department does lots of other things and it's almost an expectation "well why can't you do it, you should be doing it". And that's almost a sort of an inclusivity or an exclusivity, which isn't right. This is a Health Board issue; everyone who gets paid by this health board has some involvement in it.*

Nevertheless, an OH professional proposed some positive outcomes for their department from the pandemic, which, it could be argued, may have stabilised OH networks and, by extension, the HCW influenza immunisation network: '*it positively raised the profile of Occupational Health...It did bring the team closer together'.* Furthermore, an OH informant reported that they enjoyed the more active mobilisation, as a vaccinator, which enabled them to use their clinical skills, instead of administrative work.

OH staff also testified that the influenza pandemic has had long term positive implications in terms of enrolling and mobilising other health professionals in the planning and administration of the seasonal HCW influenza immunisation campaign:

> *I liked that it caused networks to form in the organisation that hadn't previously been there and those relationships have continued...it probably brought Public Health, Communicable Diseases and Occupational Health into the broader regional networks. We were aware of who was who whereas before we might never, we might come and go in meetings, meetings, meetings. My connection with the Medical Director, I'm on first name terms, I shouldn't be at my level.*

In addition, OH departments were themselves enrolled and mobilised in new networks during the 2009-10 influenza pandemic. Welsh LHBs were enrolled by way of a letter from the then CMO for Wales to provide influenza immunisation for LAs (including council staff, staff and residents at care homes, home care givers and Special Needs schools) and to people in the general population suffering from egg allergies. LHB OH professionals stated that most LA OH departments had not been enrolled into the influenza vaccine network prior to the pandemic and did not have experience of delivering vaccinations. In both LHBs, these additional roles were delegated to the LHB OH departments and this was problematised by LHB OH staff, both in terms of staffing the administering of the vaccines and the availability of vaccines. Some OH professionals reported that they offered to train LA OH nurses and Community Nurses and District Nurses to vaccinate but this offer was refused and their enrolment into the network was unsuccessful. Both vaccinators and vaccines were, therefore, diverted to other (non-LHB) places and potential vaccinees.

These problematisations led to a more self-conscious attempt at interessement, directed at managers from other departments to secure active enrolment in the network promoting the pandemic immunisation campaign. In LHB B, OH professionals enrolled LHB non OH

professionals, and Primary Care and Child Health colleagues, to help with these additional immunisation duties. Their enrolment remained voluntary and mobilisation was not stabilised:

> *one of the concerns were that the number of people who said they would make themselves available was not matched by the number of people who actually turned up to do it. And there were some people who were freely available and were quite happy to vaccinate but didn't. And it was often an issue that was presented was that there were other things going on. I will use my words carefully, but there was other serious work to be done now and there was very much my feeling that if you've got a vaccination campaign going on for a potentially very serious illness that is important...I think we found that it was difficult to enlist that consistent support of people who weren't normally involved in the frontline of clinical care.*

The difficulty in mobilising these non-OH immunisers, due to the instability of the enrolment of training provision in the network, was put forward by the same informant: *'the other practical issue that, is that people who weren't involved in clinical care on a regular basis needed to be trained, have practical sessions, supervised sessions. And part of the problem was that that never materialised'.* Nevertheless, OH staff saw potential long-term implications for drawing other colleagues into the seasonal HCW immunisation campaign network:

> *You know I'm thinking about planning now our flu campaign and I'm meeting with our Immunisation Co-ordinator and our Emergency Planning Lead...Never would have thought of even, the flu campaign was our domain. Why would I want to meet with anybody else? That's what Occupational Health do. So you forget that since then, like*

the three witches around a coven, but you find that kind of network and support and what does the Immunisation Co-ordinator get in place and what's Emergency Planning going to offer us that. It's changed practice, it's just changed practice.

An equal, if not bigger, challenge came from changes in hybrid actants, the vaccine and its delivery system, which required adjustments from the human actants; new working practices had to be integrated into the OH role and vaccinators 'reconfigured' (Woolgar 1991). The vaccine now appeared in two different guises, which needed to be handled differently.

Where the seasonal vaccine had black-boxed the circumstances of its production history, the pandemic vaccine exposed these to a greater extent and made different demands on its human partners in administration. These were reinforced by changes in the technical instruments for injecting the vaccine. Seasonal vaccines were supplied in single-dose pre-filled syringes (PFS), but the pandemic vaccines came in ten-dose vials, which had to be drawn up by vaccine administrators into individual syringes. This was more time consuming and it was reported by OH professionals that this could lead to more wastage if the cold chain were broken when administering the vaccine to HCWs.

Furthermore, some OH staff asserted that lower quality syringes and needles had been supplied by the UK Government and, combined with the greater viscosity of the pandemic

vaccine[85], this made injections physically more difficult to perform. Some KIs went so far as to suggest that repetitive strain injury (RSI) could result; however, others did not agree with this suggestion. The vaccine network was destabilised by these changes in the action of hybrid members.

Injection equipment has never been a 'mere tool', nor just an intermediary between vaccine, vaccinator and vaccinee. Injection equipment transforms the vaccine into a painful experience when the vaccine traverses the human's bodily boundary by the needle piercing the skin of the vaccinee[86]. It may also be a painful experience for vaccinators, as some proposed. However, the equipment had become black-boxed by OH staff in their seasonal programmes, at least; if not for vaccinees. Then the pandemic vaccine unblackboxed it through its insistence on a different material form of the vaccine (i.e. more viscous) and a different way of transporting the vaccine (i.e. in a ten dose vials, rather than single dose as in the seasonal programmes). The vaccine and vaccination giving equipment is only useful if the vaccinator has training, knowledge and expertise (gained through experience) in vaccinating and giving knowledge/counselling vaccinees to be vaccinated. Gaining this expertise transforms human actants into successful vaccinators and the hybrid actants into successfully inserted vaccines. OH staff proposed that they were more expert at vaccinating than champions and could give vaccinations with minimal discomfort to the vaccinee. This could

[85] The viscosity of the pandemic vaccine also had negative consequences in terms of HCW uptake of the vaccine due to the severity of the local reaction at the injection site that it caused. Immunisers and vaccination champions reported that knowledge of this side effect was relayed to other HCWs thereby causing them to refuse the pandemic vaccine.

[86] In Chapter Six it is reported that several HCWs said that they have needle phobia, which led to them remaining unvaccinated.

dis/encourage HCWs to re-attend for vaccination next year and to dis/encourage colleagues to attend. They also reported that they are better at persuading and mobilise HCWs to accept seasonal influenza season. As is reported elsewhere in this chapter, vaccination champions refute this claim.

Furthermore, the flow of pandemic vaccines, in addition to seasonal vaccines, into the LHBs meant that refrigeration of vaccines was an issue, with new hybrid actants, i.e. more fridges, having to be inserted into LHB A. However, at LHB B another KI proposed that the pandemic vaccine could be kept for several hours without being refrigerated and that you did not even need to take your cold bag with you when running mobile vaccination clinics, unlike seasonal vaccines. This, she claimed, allowed her to mobilise HCWs as vaccinees more opportunistically, for example, at meetings and study days.

In addition, OH staff problematised the flow of pivotal hybrid actants into the LHBs by national actants; that is, the supply of the pandemic influenza vaccines and associated delivery equipment. However, in contrast with preceding seasonal vaccination campaigns, the financing of pandemic influenza vaccines for LHB use was not reported by OH staff as an issue; but funds for vaccines only do work in the net if the vaccines are available to be purchased and, therefore, begin the journey from the supplier.

In LHB A, the flow of seasonal and pandemic influenza vaccines during the pandemic was a problem, with OH professionals reporting that they ran out of them at times during and at

the end of the pandemic. This could account for their lower than Wales average for seasonal vaccine uptake during the pandemic, compared to their higher than average pandemic uptake. This may have been a missed opportunity to enrol vaccinees in the seasonal vaccine network, with LHB A also having lower than average seasonal vaccine uptake in the 2010-11 winter season following the pandemic.

A KI at LHB A reported that the blockage of vaccines into LHB A was in contrast to the overabundant flow of vaccines into Primary Care, where the informant was offered the H1N1 vaccine when visiting the GP for another medical issue: '*GP saying, 'you know we've got a stock of vaccines, we need to use them. I'm offering them to people as they come in, do you want to be vaccinated''*. The same informant asserted that they did not accept the vaccine from their LHB because they did not want to take a vaccine that could have been administered to a frontline HCW. While this narrative portrays the informant in a morally positive light, the insertion of a vaccination into a key LHB actant may serve to mobilise other LHB staff as vaccinees, and therefore the diversion of a vaccine to a non-frontline HCW may be worth the sacrifice.

A KI at LHB B also reported that pandemic vaccines were being obstructed from flowing to HCWs because they might need to be diverted to Primary Care patients:

> *The other complicating factor was that if we were going to push through with the hospital staff being vaccinated in the occupational health service of the hospital being used to vaccinate other people, were we going to be allowed x number of vaccines for*

> *that week and the locality medical directors in each of the five boroughs, were saying 'you know we need to keep this stock of vaccines back for Primary Care'. So we never did get to the situation where we exhausted the number of vaccines that we were allocated but it was that again uncertainty if you're telling me to go out vaccinating and you want me to vaccinate everyone I expect the resources to be there. The subliminal message was 'well yes you can but as long as it's within this number of vaccines'.*

Economic associations were also identified as affecting the flow of pandemic vaccines. An OH professional problematised the different funding arrangements of the Primary Care and HCW immunisation programmes during the pandemic:

> *I think in Primary Care we were told they would be paid five pounds for every vaccination that they gave, in the hospital that wasn't happening. Yet the same pool of money that came from the Welsh Assembly was going into Primary Care but with no consideration for us to be allowed the opportunity to buy in agency staff who could perhaps help out with the vaccinations. So there, as well as the chaos there seemed to be different standards depending where you sat within the healthcare picture.*

This economic variability in primary and secondary care is also present in the seasonal programmes.

Inserting payments for administering vaccines into a network also does symbolic work: 'Marking an event in monetary terms gives it an official seal' (Strathern 1996: 527). However, 'This stimulator of flows can stop flow' (Strathern 1996: 527). For example, GPs receive payment for vaccinations given as part of the Childhood Immunisation Programme, but only

up to the herd immunity level. Therefore, it could be argued that the removal of payment for further vaccination discourages GPs from seeking to vaccinate 100% of potential vaccinees.

In addition to the logistical difficulties posed by the pandemic campaigns, KIs also complexified and problematised their role as enrollers of HCWs to accept a novel pandemic influenza vaccination: '*I think the struggle for us was that people said a pandemic was coming and no one really understood what that meant. So to try and encourage public uptake and try to encourage staff uptake that first year was really, really tough'.* This task was exacerbated by work done by the pandemic vaccine itself, in terms of the off-target effects that it co-produced with the vaccinees' immune systems[87]. However, OH professionals attempted to de-problematise this issue through counselling-work: '*sore arms, localised reaction...But we were just telling people, "it won't hurt now, it will hurt in about 8 hours, two days' time it'll be fine. If you roll over on your arm in bed tonight it's going to hurt...take a couple of paracetamol"'.*

One particular at-risk group of HCWs was singled out by OH staff as being problematic to enrol during the pandemic because influenza vaccination had not been recommended for pregnant women before the pandemic. OH professionals problematised both their role and the role of midwives as enrollers of pregnant women to the network:

[87] I will examine this further in Chapter Six.

> *midwives could have done better at selling it...I'm not an expert but, my field is Occupational Health, I'm not a midwife and this was the first year that really vaccinations were being pushed for pregnant women. That was a big deal, that was a big change...I had Occupational Health nurses that didn't want to vaccinate pregnant staff because they felt uncomfortable with it and I had a lot of work to do around "this is the expert advisory guidance, you have a professional duty". We need to be strong and solid in our own practice, you can't be dithering. These pregnant women, these pregnant staff are going to look to us to have answers...I didn't really accept Occupational Health nurses taking umbrage with it because the evidence was staring us in the face and I think if you are an evidence based profession "I don't like the idea of" isn't really good enough.*

The quote from the OH professional demonstrates awareness of OH professionals' lack of expertise around pregnancy, and OH professionals' agency in being able to refuse to vaccinate pregnant women, even though official guidelines advised them to do so; even though the informant seems to be aware of the ethical obligations of HCWs, i.e. 'professional duty to vaccinate[88] . In addition, the informant identifies midwives, while having expertise about pregnancy, as also not being completely successful in mediating the flow of pandemic vaccines into pregnant HCWs. While OH professionals have knowledge around vaccination and midwives have pregnancy expertise, the two groups of HCWs failed to aggregate their expertise and distribute their agency between themselves as enrollers of pregnant HCWs as pandemic vaccinees. However, an OH professional reported that the pandemic has resulted in a change in their practice as far as vaccinating pregnant women is concerned: '*But we do*

[88] This is considered further in Chapter Seven.

now [vaccinate pregnant women] because the H1N1 is part of the seasonal and so that's a change in practice. It's something we're very comfortable with'.

So the 2009-10 influenza pandemic was a turning point in OH enrolment in the network, in which influenza vaccines demanded more active mobilisation of not only OH staff, but them also enrolling other HCWs as vaccinees and vaccination champions. This resulted in higher levels of HCW influenza vaccine uptake than during pre-pandemic winter seasons. However, whether this mobilisation would have been sufficient to facilitate the flow of enough vaccines in a more serious pandemic was challenged by an OH professional:

> *I've spoken to the Emergency Planning people and said "if it was avian flu, if it wasn't swine flu, we'd be up the creek without a paddle. We'd all be dead, we'd all be dead [laughs] because we couldn't have delivered it quickly enough". And that's still an underlying fear, we don't have processes in place, for seasonal flu fine, if we had a, swine flu was a pandemic but it didn't hit as hard as what people thought it was going to. If that was avian and the death toll was high um our service, our method of delivery is crap.*

A solution to this potential issue, in the form of enrolling and mobilising new actants into the network, was put forward by the same informant:

> *I need ward managers and department managers to be trained to vaccinate their own staff. And so that everybody could get vaccinated within a week. That's what I would need. If a ward manager vaccinates 30 people that's manageable. If I've got to vaccinate 30 in a half that's not...That's what I wanted to do post pandemic is to make*

this a normal part of nursing managers jobs. So I can concentrate on vaccinating everybody else that can't, don't have that professional skill. So that if avian or another mutation hit I would be really confident that the training, they know how to do it, the training is in place, it's just a different type of vaccine...haven't got there yet.

The success of these novel enrolments post-pandemic are considered in the next section.

Post-Pandemic Influenza Vaccines' Journeys through the Local Health Boards

The H1N1 pandemic influenza virus was a key actant in the 2009-10 pandemic HCW influenza immunisation programme, acting to enrol and mobilise HCWs as vaccine recipients[89] and vaccination champions, and facilitating the flow of seasonal influenza vaccines. This role has continued since the pandemic with seasonal vaccine uptake remaining higher than pre-pandemic rates. A number of factors were proposed by informants to explain this increase.

Informants from both LHBs reported a change in practice of the OH departments, in that influenza vaccines now flow through mobile vaccination units (rather than HCWs having to attend the OH department) to a much greater extent than before the pandemic, as a KI at LHB B exemplified:

it's now part of our natural cycle...it was quite low key, now it's not, now we really push for it...a lot better about delivery and at the time we tended to be quite

[89] HCWs as vaccine recipients will be examined in Chapter Six.

traditionalist in the original ways of doing it in that we used to set up clinics and expected people to turn up, we are very different about that now. So we'd always done it where we've gone out and delivered to the high risk areas, so Occupational Health used to do that, but what we do now is we do the 'jab and grabs' in the canteens, we go out and we're visible where people are and so it's easier for them to get vaccinated whereas historically they had to make an effort to go somewhere to do it.

So, HCWs now have less far to travel to meet the flow of post-pandemic seasonal vaccines; and the mobile vaccination clinic may be more visible to HCWs, facilitating opportunistic vaccination. As is considered in more detail in Chapter Six, this allows vaccines to flow into HCWs who have limited time and agency to attend OH based clinics during work hours. The processes of exclusion seem to have been curtailed by the pandemic, if not entirely stopped. In turn, OH staff have enrolled and mobilised more health professionals as vaccination champions since the pandemic. As was examined earlier in this chapter, vaccination champions proposed that they have the potential to facilitate the flow of influenza vaccines into more HCWs, than OH vaccinators.

However, despite increases in both LHBs, the rate of increase in LHB A was significantly lower than LHB B where, as a KI proposed, during the winter influenza season of 2010-11 the seasonal immunisation programme had yet to be stabilised because key human actants had yet to be enrolled into the network: '*because we didn't have the vaccination and immunisation co-ordinator, we probably just took our eye off the ball and just sort of just stepped back a bit really from it...So I think it was just that intensity of all hands on deck during*

the pandemic "we've got to get through this"'. Whereas, a KI at LHB B reported that, even though the pandemic is now over, the pandemic virus has managed to embed and 'black box' itself into (at least in LHB B) seasonal HCW influenza immunisation programmes: '*we took what we learnt from the pandemic and we've kind of treated every year as a pandemic...we took what we did for pandemic and we attached it to seasonal flu'.*

In 2009, the H1N1 influenza virus re-emerged as a novel pandemic virus and succeeded in enrolling and mobilising LHBs and HCWs as vaccinators and vaccinees in the network. This mobilisation was not stabilised, however, as the LHBs (or at least LHB A) and their staff were soon enrolled and mobilised in other networks to tackle the next 'crisis' in the NHS:

> *in some ways life has just sort of moved on and I think it probably reflects that we haven't learned from our mistakes...was going to be a sort of a feedback group, we were supposed to have everybody participating and I think a hand full of people turned up. I haven't seen any statements come out saying these are the important learning points and that's probably worrying because we've just carried on certainly for at least 2 years doing the same old stuff that we done back in 2009.*

This is despite the fact that it was reported that levels of influenza patients in the two hospitals were higher in the 2010-11 winter season than during the 2009-10 pandemic, as was reported by a KI at LHB B: '*Seasonal can be just as much of a killer as the pandemic. And 'cos even though the pandemic was 2009, the following year we were hit much harder, so it affected us greatly but we were lucky 'cos we had a lot of systems in place by then; that was good'.* Furthermore, a KI at LHB B proposed that the stabilisation of HCWs as vaccination

champions have facilitated the flow of vaccine post-pandemic: '*So we used people who were consistently reliable and that's who we used the last year and the year before. It's worked out'.*

It was only with the work of this virulent post-pandemic seasonal influenza virus (which now included the H1N1 strain) in 2010-11, which resulted in the subsequent introduction, in the 2011-12 winter influenza season, of the PHW immunisation target[90] of 50% uptake by frontline HCWs that the network was temporarily stabilised again. However, mobilisation of the target was voluntary and informants at LHB A reported that they decided to aim for their own, lower target. KIs in this LHB problematised the PHW immunisation target and cast doubt on their ability to reach this target. Furthermore, KIs in both of the LHBs problematised the ability of OH departments to reach even higher targets in the future.

However, the PHW target was also reported by OH staff to have led to positive changes during the 2011-12 season in terms of increased mobilisation of finance for vaccines and OH staff availability in the network: '*there's never been a concern this year in terms of availability. I've mentioned pressures of finance along the way but it was very much if you want it you can have it. And certainly the team are much, much more driven this year in terms of "yes we will be freely available"'.*

[90] Targets are also considered in Chapters Four, Six, Seven and Eight.

OH professionals argued that the availability of vaccines is in contrast to the availability of OH and non-OH immunisers, which is still a barrier to reaching such a target. This problematisation was simultaneously deproblematised by those OH professionals who stated that there are no sanctions for not reaching the target. This lack of consequences means that there is still room for LHBs and OH professionals to negotiate their role in the network, by introducing their own lower target. The target is, therefore, a target *in potentia* and not *in actu*, as it has no power to sanction the LHBs.

This problematisation was simultaneously deproblematised by OH staff proposing the future enrolment of more vaccination champions and by the enrolment and mobilisation of new actants in the form of agency staff to vaccinate. The role of vaccination champion was problematised and complexified by OH staff, simultaneously serving to secure their role in this network as obligatory passage points.

KIs reported that the pandemic introduced new actants or expanded/re-assembled pre-existing networks, which facilitated the flow of post-pandemic vaccines. For example, it forced the LHBs to develop emergency plans and these have continued to be improved upon since the pandemic; in LHB A, the role of vaccination coordinator was expanded as a result of the pandemic; and, the change in practice by OH departments in terms of the use of mobile vaccination clinics and non-OH vaccinators has continued in both LHBs. In LHB B, the 2010-11 winter influenza season saw the enrolment of non HCW LHB staff, non-HCW LHB staff

working on LHB premises and students into the influenza immunisation network as potential vaccinees.

Another KI testified that they and another human actant, the Medical Director, in LHB B had a major role in extending the boundaries of which staff working on LHB premises would be prioritised for influenza vaccination by a broad interpretation of hybrid actants, Welsh Assembly policies and the 'Green Book'; this was enabled by the presence in the network of more hybrid actants, seasonal influenza vaccines, than in pre-pandemic seasons.

OH professionals also proposed that the enrolment and mobilisation of hybrid actants, such as yellow t-shirts (supplied by pharmaceutical companies at the time)[91] for vaccinators and champions to wear during the post pandemic seasonal influenza vaccination campaigns, the use of vaccination bags and photographs posted on the staff intranet site of Clinical Directors and Chief Executives receiving influenza vaccinations, rather than other immutable mobiles (such as generic posters) have raised the profile of the campaign and helped to enrol HCWs as vaccinees. However, the latter tactic was also problematised by the same OH professional:

> *it's often said if you get the most important person in your organisation to show they're having it, hopefully that will persuade people, but from the people that I meet on a day-to-day basis "well yeah so what, thank you very much"...And people will often say "I haven't got the time to read sort of page of spiel that comes up on the intranet,*

[91] Pharmaceutical companies are no longer allowed to supply promotional materials, such as t-shirts, bags and posters, in the UK.

> *we've got clinical jobs to do"...Perhaps there's not an appreciation that the guys who are delivering care actually are working pretty damned hard and they don't have the time to read these things.*

Furthermore, the mobilisation of LHB staff at Clinical Director and Chief Executive level as vaccinees and enrollers of other HCWs was reported to be not always easy to achieve.

In addition, the yellow t-shirts may have been 'too successful', with a KI proposing that there are now enough immunisers in their LHB, as evidenced by the perceived overabundance of yellow t-shirts. Other informants also argued that there is a fine balance to be struck between under and over exposure of the programme, in terms of starting to advertise the campaign too early.

As far as future campaigns are concerned, an OH professional simultaneously proposes and problematises the use of vaccination champions:

> *I suspect the next way forward is to identify champions within the surgical division, the paediatric division. Use them as the main link lead and I think provided they follow the protocols and the consent forms, they will have more opportunity to vaccinate people. Some health boards have tried that, it's only given, in Wales it's only given marginally a little bit of success maybe...But it seems that it's a lot more effort for not much more return.*

Furthermore, an OH professional complexified the role of OH staff as immunisers and proposed that the most effective future role for non-OH staff is working just as vaccination champions rather than immunisers. OH professionals also questioned whether it is more effective to enrol a large number of vaccination champions or a smaller pool which are easier to keep track of. They reported that another LHB (not being considered in this study) which had enrolled considerably more champions than their own LHB had not achieved much higher vaccination rates among HCWs.

As for the future of immunisation campaigns and influenza pandemics, there was no consensus among KIs; with one at LHB B contending that their pandemic network could be quickly reassembled:

> *I think that we've got far, I think we're far readier for if we were put in the same position again, that we had a pandemic, I'd feel that we could quickly rally the troops and you know depending on the nature of whatever kind of pandemic came, we'd be much more prepared for it as a result of the work we've done because we didn't let go after the pandemic, we kept that work going on.*

Whereas, another at LHB A proposed that the network remains unstable as LHB priorities change:

> *I think prioritization in terms of you know we're a big organization with a small corporate and management team and sometimes I'm conscious that if you make the corporate and management team focus on a single issue you can get rapid change of performance. Other issues, like this month the 4 hour wait RTT, means that the*

> *corporate focus goes somewhere else and that sometimes means that performance drops back in some areas. And you know you can't have the same focus on every issue...you know when it does drop back, it usually drops back to the level greater than the level you started with, the baseline level, but you can, you know you've only got the capacity in an organization to drive so many things to a certain point in a certain time...there might be other priorities at certain times...it's still taken seriously but it's less of a challenge this year because it hasn't occurred. You know it's always got to be there that something you're prepared for but it sort of waxes and wanes.*

OH professionals also proposed that the HCW influenza immunisation programme is inherently unstable due to the variable nature of yearly seasonal influenza outbreaks. Several informants proposed that a mild influenza season may have a negative impact on staff mobilisation, in terms of vaccine uptake, during and/or in the following influenza season. Furthermore, it was proposed by a KI that a successful immunisation campaign could have a negative effect on the subsequent influenza season's vaccine uptake by HCWs because of a perceived sense that seasonal vaccination is no longer required, especially if only pandemic vaccine is available.

Both seasonal and pandemic influenza vaccines may be victims of their own success, leading to the inherent instability of the programme, until the next serious outbreak, epidemic or pandemic emerges. This suggests that there may be little scope for 'stabilisation in advance' through pandemic planning (Dingwall, Hoffman and Staniland 2012), as an OH informant highlighted: '*We will get there maybe but I think that you'll need sort of, you'll need fear, an emergency to drive it and I'd rather drive it when we're in calm and can plan*'. That is, the

creation of an immunisation programme actor-network that is primed for rapid mobilisation by a novel non-human actant, an influenza virus with pandemic potential.

Conclusion

In this chapter I revealed some of the routes through which influenza vaccines can attempt to flow into and through LHBs into HCWs as vaccinees. An obligatory passage point to all these possible nodes in the network was OH departments, particularly OH nurses. Despite the attempted mobilisation of OH professionals as vaccinators by national-level actants, this mobilisation has not been altogether successful. OH informants reported that the immunisation programme competes, arguably unsuccessfully, with other roles in their network. Informants stated that the mobilisation of OH departments to deliver the pandemic immunisation programme has resulted in their more successful mobilisation in subsequent seasonal immunisation programmes. They also highlighted that this has also been partly due to the insertion induced by the H1N1 pandemic influenza virus and implemented by another macro-level actant, PHW, of a 50% target into the network every year winter influenza season since 2011-12. OH professionals also described how they have translated this target and as a result it can be argued that the target has failed to the extent that it has not been reached but nevertheless succeeded in mobilising more seasonal vaccines (through the work of WG supporting the cost of them) and vaccinees (through the insertion of mobile vaccination clinics and vaccination champions). OH professionals and departments remain, and will continue to be, key actants in this network. However, in order to further stabilise the network, OH professionals must enrol and mobilise other actants as vaccination champions and vaccinators. KIs proposed that the use of such actants is problematic but the vaccination

champions, themselves, reported that they can be more successful than OH actants in mobilising colleagues as vaccinees.

Having considered the role of OH and non-OH professionals as enrollers and immunisers in the HCW influenza immunisation programme, the question that must now be considered is how much impact does the planning and administering of the programme have on HCWs acceptance of the vaccine?

The following extract from an OH professional casts some doubt on the centrality of work done by human enrollers in the network:

> *I think our ability to get people on the ground to vaccinate isn't the thing that limits us. It's the acceptance of it by the people who are going to be vaccinated and their willingness to come forward. That appears to be the kind of thing I'd like is to get better at you know. I don't think I could fix this problem by hiring a whole extra bunch of people to go round vaccinating.*

Consequently, the next chapter will consider how successful the work that is, or is not, being done in the network by the actants that I have already considered in this chapter and by other heterogeneous actants, including influenza viruses and influenza vaccines, is in this network. In order to do this the accounts from health professionals will be examined, not as enrollers, but as acceptors and non-acceptors of influenza vaccines in the network.

Chapter Six

The Journey into Healthcare Workers

Introduction

In Chapters Four and Five I considered the difficult journey that influenza vaccines have to make to cross the LHB organisational boundary and flow through the LHBs. In this chapter the narrative now moves on to examine the final stage of the journey that vaccines make into HCWs as vaccinees.

Thus far the narrative of the journey that influenza vaccines take to get to HCWs has been mainly constructed from the study of documents, and the accounts of KIs, and vaccination champions in Chapter Five, who were primarily being interviewed because of their role of being involved in the HCW immunisation programme as organisers and administrators, rather than as potential or actual vaccine recipients themselves; although the latter may also be true. This chapter considers accounts from HCWs in their role as the final destination on the influenza vaccine's journeys, i.e. as individual vaccine recipients.

As was the case with vaccination organisers and administrators, the vaccines must mobilise HCWs as vaccinees from teams which are made up of heterogeneous actants from all LHB professional and departmental LHB networks; namely Medicine, Nursing and Midwifery, and emergency, paediatric and obstetric, respectively, in this study.

Entering the Healthcare Worker Knowledge Assemblage

In Chapter Five, I revealed that the relational ontology of this immunisation programme network defines HCWs simultaneously as 'consumers', choosing to go to their OH department or a mobile vaccination clinic to be vaccinated every year, and as 'recipients', who need to be encouraged by OH and non-OH staff, and by hybrid actants such as posters, leaflets and staff intranet announcements, to attend for, and accept, influenza vaccination. Chapter Five considered the difficulties that LHB staff face in mobilising HCWs as vaccinees. This chapter examines these issues from the perspective of potential vaccinees.

Where an immunisation programme is not mandatory, HCWs first have to be convinced to accept vaccination in order to be mobilised as vaccinees. Therefore, before a vaccine can cross the dermal or nasal boundary, they first have to enter the 'knowledge assemblage' of the HCW. Vaccines can achieve entry into the knowledge assemblage of HCWs through a variety of different mediators; some official, some quasi-official and some non-official. As an ANT informed study, I would argue that knowledge is never just inserted into a network; it is always translated by other actants already enrolled in the network.

In ANT, 'Knowledge itself is an actor-network, a compositional entity' (Baiocchi, Graizbord and Rodríguez-Muñiz 2013: 15) and is challenged as an 'explanatory category' (Latour 1987). ANT understands knowledge as an effect rather than a cause (Cloatre and Dingwall 2012) and 'as being part of the "explained" (or "to be explained"), rather than part of the explanatory…For Latour, knowledge is more than an abstract concept or a reference point…' (Cloatre and

Dingwall 2012: 8). The ANT approach highlights the material nature of knowledge, as Law (1992: 381) elucidates:

> I put "knowledge" in inverted commas because it always takes material forms. It comes as talk, or conference presentations. Or it appears in papers, preprints or patents. Or again, it appears in the form of skills embodied in scientists and technicians (Latour and Woolgar, 1979). "Knowledge", then, is embodied in a variety of material forms. But where does it come from? The actor-network answer is that it is the end product of a lot of hard work in which heterogeneous bits and pieces – test tubes, reagents, organizms, skilled hands, scanning electron microscopes, radiation monitors, other scientists, articles, computer terminals, and all the rest – that would like to make off on their own are juxtaposed into a patterned network which overcomes their resistance. In short, it is a material matter but also a matter of organizing and ordering those materials.

However, I would argue that knowledge may not originate in a material form, even though it may only be seen through the use of material forms. Furthermore, it is only sometimes given in a material form. In this chapter, I will illustrate that knowledge of this network not only comes from material actants (e.g. CMO letters and posters) but also directly from human actants (i.e. other HCWs) and non-human actants (i.e. influenza viruses). Moreover, the material forms of knowledge are themselves originated from, and consistent with or constrained by, the ideas of human actants[92].

[92] This is a novel scholarly contribution. ANT scholars have struggled with the problem of knowledge and have to some extent disregarded it as an object/subject of study.

Some studies on HCW uptake of influenza vaccines have focussed on a 'deficit model' of HCW knowledge about influenza viruses and influenza vaccines (for example, O'Rorke et al. 2003; Hollymeyer et al. 2009; Maltezou et al. 2010; Seale et al. 2010). However, the decision making process is not always 'rational'[93]. Simon (1957) proposed that rationality is 'subjective' or 'bounded'; while Greenhalgh et al (2014: 213) offered that 'decisions are not merely 'rational' (that is, based on the best available medical evidence) but also practical and ethical…'[94]. Furthermore, individual vaccination resistance has been characterised by some as a rational response (Rogers and Pilgrim 1995), given the ability for individuals to 'free ride' and enjoy the benefits of herd immunity while avoiding the perceived (and real) risks of vaccination. This rational model may be even less relevant in a pandemic when an epidemic psychology (Strong 1990) may be at work in the net[95], as KIs highlighted at both LHBs: '*there was this confusion and this panic, people [HCWs] weren't thinking rationally [during the pandemic]'.* Nevertheless, several informants from both LHBs, including a KI from LHB A, proposed that HCW knowledge is a factor in the acceptance and non-acceptance of influenza vaccines: '*most people are intelligent aren't they and if they actually understand the benefits and why they're having it, then most people will voluntarily have it done I would have thought'.*

However, a paediatric HCW at LHB A reported that OH staff have not been mobilised to dedicate sufficient time to insert enough information into HCWs in the network, particularly during a pandemic: *'because they've got so many to get through, I don't think they've got time...I don't think they really had time [during the pandemic] to go into any pros or cons or*

[93] Something which the Department of Health recognises (DH 2011).

[94] The ethical dimensions to decision-making in this network are considered in Chapter Seven.

[95] Although, as shown in Chapter Five, the entire network may not be subject to this 'epidemic psychology'.

any really detail of what it was going to do for you...they didn't really explain why they wanted us to have it'. This may also mean that OH have not been mobilised to commit enough time to build a relationship of trust and fulfil the counselling role with potential vaccinees[96]. Chapter Five considered the insertion of a fact sheet into LHB B during the pandemic to perform this counselling role for vaccinators. Given the informant's account above, such an immutable mobile seems to be one way of facilitating influenza vaccines into HCWs' knowledge assemblages, particularly during pandemic situations.

So while the H1N1 virus and vaccine may have successfully enrolled new HCWs into the influenza immunisation network, informants proposed that the HCWs' mobilisation as vaccinees was not always as successful during the pandemic because not enough information and knowledge about influenza viruses and vaccines had been inserted into HCWs before and/or during the 2009-10 pandemic.

One reason for this lack of success was that influenza viruses have competed unsuccessfully with other actants for HCWs' time in terms of education and training. A KI at LHB A complexified the inserting of information about influenza viruses and vaccines into the HCW network, in terms of the time taken to do this (particularly in a pandemic situation):

> *it's just so much time to get out to everybody...when you're in a crisis with everything else, it's just you send stuff out but do people read emails and I feel it's always far better to do one to one teaching than just sending guidance out because people don't*

[96] Something which in Chapter Five, a vaccination champion proposed was an issue for OH vaccinators.

> *read it, it takes a long time for people to undo their own knowledge base, or actually you could work through their own bias against something...cascading information is, communication is always a challenge isn't it? Can you honestly say you've got to every practitioner and they've understood it is way more challenging. We've just sent it out in an email, we've told you...When that crisis occurs, oh gosh we need to know way more.*

A solution to this was proposed by an ED nurse in LHB B, i.e. that part of the vaccination champion role could be to insert more information about influenza viruses and vaccines into their colleagues: '*that person could perhaps like educate people...you know just passing information around, that could help'.*

Influenza vaccines seem to have failed to enter some HCWs' knowledge assemblages, with several informants reporting that they are unaware of when the vaccination programme takes place, even since the pandemic. They stated that they do not have enough time to insert knowledge about the programme into their network because they are too busy to read their emails. Furthermore some groups of health professionals, particularly non-medical staff, may not have regular access to a personal computer and email.

Nevertheless, informants at both LHBs testified that since the pandemic more appropriate information has entered HCWs' knowledge assemblages through the further mobilisation of LHB actants. For example, a KI at LHB A testified that: '*It was all very reactional before [the pandemic]. Information is much more clear and factual now. They've all had training in it'.*

However, not all informants agreed that this education has been completely successful, as a paediatric HCW at LHB A reported*:*

> *So I'm still reasonably open minded but I just need to be, I need to be given more facts...if any of these programmes come along and they could show that I'd be protecting myself and people I work with and the patients in that period it might give more of an argument to have some sort of jab...And if people can give me that information I can make a decision.*

This raises the ethical question of whose responsibility it is to attempt to insert information about influenza into HCWs' networks[97]. As evidence based practitioners, is it the HCWs responsibility or is it the LHBs', as an OH professional asked: '*whose job is it to educate the employees with an organisation?...We [OH] could do some of it, infection control can do some of it. Primary care will say they can't be bothered, it's too many other things to go on'.* Some informants, including a KI from LHB A proposed that this was the responsibility of the LHBs: '*So in a way we should be meeting the needs of the people that we employ. We also need to educate the people we employ, to make sure they realize what their needs are. You know it's a two way thing'.* However, informants testified that HCWs do not have enough opportunities and/or time to be educated in what their needs are. A paediatric doctor reported that this is a particular issue for nurses:

> *it tends to reach a medical audience, nurses don't go to that. In fact I think there's been an issue with nurses getting access to that sort of CPD isn't there. Really proper*

[97] This will be discussed further in Chapter Seven.

> *education about flu, not just told "the flu vaccine is coming, you need to get the flu vaccine". To understand the real threat of flu in the world 'cos that's what shifted my point of view, I thought I was invincible and realised lots of invincible young men and not so young men got killed by flu. So that's changed my view on it.*

A senior midwife also reported that this is an issue for midwives and that influenza vaccines compete unsuccessfully with other training for midwives' mobilisation:

> *It's just with everything they've got to learn. You know it's about that balance isn't it. When that crisis occurs, oh gosh we need to know way more so do they need to know more and learn more about postpartum haemorrhage and it's just how much they are bombarded with. You know I do feel sorry for them really and how much they're supposed to keep up to date with. Everybody, I get queries all the time, from all angles, can I come and speak to, train your midwives on this and that? If I said yes to everything they'd be in a classroom 52 weeks of the year being updated on. It's just a balance isn't it? It's hard, so. You know there's cot death, there's breastfeeding and you know things change and that's just one of them I guess really. So you know they should be up to date, but there's just a limit to what you can do.*

Furthermore, KIs at both LHBs similarly reported that HCW influenza immunisation training competes unsuccessfully with other training requirements in the LHBs. So influenza viruses and vaccines have failed to insert themselves into the infectious disease training network for HCWs. In fact, unlike other continuing professional development (CPD) courses, the influenza virus has failed to insert HCW influenza training as an annual compulsory training module in

the national network, which also have monitoring processes in place[98], and therefore it has to compete with other non-compulsory and compulsory training to gain HCWs' attention in the local networks[99]. KIs at both LHBs recognised that this is an issue.

However, a KI also proposed that you can insert too much information about influenza immunisation into the net, in terms of starting the information campaign too early, and that the information should start its journey only a few weeks before the vaccines begin to cross the bodily boundary of the HCWs because other issues will compete for HCWs' attention in the period between inserting the information and attempting to insert the vaccine into the HCW. Therefore, part of the instability of this immunisation programme network is because of other actants which continually attempt to compete for the mobilisation of HCWs. In order to be temporarily stabilised, the network needs to be maintained by the timely insertion of knowledge.

Given the assertion by informants that HCW knowledge of influenza viruses and vaccines are important actants in mobilising HCWs as vaccinees, a number of knowledge deficiencies around influenza viruses and vaccines were identified by OH professionals and other KIs at both LHBs. The most popularly reported were:

> *the common misconception is you know that it's going to give them flu. Which is a bit surprising really, given certainly some of the population you're giving it to.*

[98] Chapter Five considered the issue of reporting and monitoring in the immunisation programme.
[99] Chapter Seven contends that this is a particular issue for nurses.

they don't understand the difference between colds and flu still unfortunately.

Furthermore, knowledge deficiencies may not be confined to non-health professionals; a vaccination champion asserted that health professionals also need more information about influenza inserted into their networks: '*I think, initially I would have probably said the more ancillary staff rather than the professional ones but my experience when trying to persuade people has been that quite a few professionals are quite ignorant to it as well. So I can't say it's on an educational level'.* I also found that some KIs' knowledge was lacking. For example, a member of the executive board at LHB A was unaware that you can have asymptomatic influenza and pass it on to others.

However, different groups of HCWs may need different sources of information inserted into their networks in order to mobilise them. The UK DH has asserted that information inserted into the net should be varied and targeted according to the section of population: 'Messaging should avoid "one-size fits all" approaches and instead be targeted to segments of the population so as to achieve the greatest level of engagement with any communications campaign' (DH 2011: 47). Informants at both LHBs also put forward this assertion; as a KI at LHB B testified their organisation had done:

the more literature that comes out from centrally that's aimed at shall I say the cleverer person, the more scientific person. You know the ten myths that come out that might suit an NA or a Staff Nurse or a person working in an office, doesn't suit the consultant surgeon...they want their evidence presented in a different way. So we started to write things...and putting all the links for papers. Because it's horses for courses, you need some, to meet on their level. And if they think something's a bit, I

> *don't know, "Mary and Ben go to the park", they don't really want to know about that. So we do have to make sure we give them the information in the language they want to hear it.*

However, another KI at LHB B proposed that health professionals may never have sufficient knowledge about influenza vaccines: '*You know I think that just because you're a health professional does that actually mean that you're gonna have a full knowledge about what the flu vaccine can or cannot do for you? '.* Furthermore, 'expert' epidemiology has to compete with 'lay epidemiology' (Davison et al. 1999) and 'folk models' of illness to be the hegemonic source of information about disease symptoms and risks. For example, informants, including KIs, proposed that they did not suffer from influenza because they had not been bed-ridden by an ILI; whereas, the 'expert' understanding is that 60-70% of influenza infections are asymptomatic[100]. Indeed, Helman (1978: 107) outlines how 'biomedical treatment and concepts, particularly the germ theory of disease, far from challenging the folk model, actually reinforce it'. Others have argued that the biomedical model is in itself a folk model of disease; and undeniably, the dominant one in the Western world (Engel 1977).

Jutel and Banister (2013: 19) have proposed that influenza is subject to a 'complex lay epidemiology':

> As loathe as medicine is to authorise self-diagnosis, contemporary public health messages about influenza are nothing more than that, and they rely upon a complex lay epidemiology of influenza. This places symptoms in a different frame than medical

[100] This issue has been considered previously and also later in this chapter.

> professionals, includes signs that are not considered by medicine to be relevant, and runs counter, in some aspects, to current medical thought (Prior, Evans and Prout 2011). As Prior, Evans and Prout have underlined, it is the "small worlds of family, friends and neighbours" (p. 7) that shape the way people assess information about disease. Given the repeated metaphorical use of the term "'flu" to describe systemic illness ("I felt 'fluey"), there is no certainty that public health instructions about influenza will accurately differentiate this infectious disease from others... Their non-specific descriptions and varied symptom patterns confirms the elusive nature of the disease entity in the same way as case descriptions issued by health departments and ministries, which list a number of potential symptoms, none of which are, on their own, or even in combination with others, enough to confirm anything other than an "influenza-like illness."...A medical frame and directive is clearly at work in the definition of influenza (Conrad, 1992) yet the condition itself (when uncomplicated) is handed back to lay control.

Despite influenza viruses 'being separated out from the confusion of competitors' (Latour 1988: 82) by the visualisation of the electron microscope and molecular diagnostic testing (known as PCR), outside the laboratory human actants are still unable to separate influenza from other influenza like illnesses:

> The single term ["influenza" has not been "] made to serve as a translation for everything that used to be covered by the term "bacillus". Without this link and translation, …[we have] a microbe that performed certain things *in* the laboratory and a disease left to itself *outside* the laboratory, with endless talk filling the gap (Latour 1988: 85).

Furthermore, the work of influenza vaccines is also difficult to prove, particularly since ILIs are difficult to differentiate between, where immune response is not immediate, and off-target effects are very similar to influenza symptoms; nor can a vaccine kill any existing sub-clinical influenza infection[101]. These may convince vaccinees that vaccination was not successful or even that the vaccine has in fact given them the illness.

I found that HCWs use both 'expert' and 'lay' epidemiology in their accounts[102] (Eisenberg 1977), i.e. engage in "hybridized" practices (Dew et al. 2013), about the HCW influenza immunisation programme, and health professionals, even those involved in IPC, may not have sufficient influenza expertise to make a fully informed decision about vaccination acceptance or refusal[103]. I suggest that health professionals' biomedical, epidemiological and clinical expertise may be characterised as concurrently 'expert' and 'lay', depending on the subject being considered. For example, Jutel et al. (2011) reported that 'health care workers were barely more successful than lay people at self-diagnosis of influenza; the positive predictive value of self-diagnosis of influenza by a HCW was only 30.1%' (in Jutel and Banister 2013: 17). This is because of the difficulty in clinically distinguishing influenza from other ILIs. Seasonal, and even pandemic, influenza is rarely serologically confirmed, and relies on self-diagnosis. Furthermore, unlike most other diseases, PH management is usually left in the hands of the public rather than experts, with self-quarantine being the most common IPC procedure

[101] Although it may shorten the length of the illness.
[102] However, I do not accept uncritically or wish to reproduce the lay/expert dichotomy which has been critiqued (for example, by Wynne 1996). In fact, my use of 'hybridized' practices is a rejection of this dichotomy.
[103] I also argue in this chapter that current evidence is insufficient for anyone to make a fully informed decision about HCW influenza immunisation.

advocated. This is complicated by 'lay' epidemiology and 'folk models' of illness, and the half-life of all knowledge (Malchup 1962).

In addition to information from LHBs, informants highlighted that non-official information, particularly from the media, compete with official information to be the hegemonic source about influenza viruses and vaccines, as an OH professional stated:

> *I think the drivers for people wanting to come and have it done [influenza immunisation] sort of go beyond those objective things. It's more about you know how, what the perceived risk is because you see something on the news or someone has died...But I think that the media plays a big part really. Even though, even amongst groups of healthcare workers as well who you know read the literature and guidance and so on. There's still influence because of the power of the media I suppose, so they're still influenced by messages that come from that.*

Rubinstein et al (2015) also found that the media was an important source of information during the pandemic. However, a KI also reported that the media's enrolment could not be taken for granted: '*So I think the media had a huge impact in sort of fear factor. Yes it did sort of nudge up vaccination rates a little bit but it was never sustained because there was always a different story coming along'.* Therefore, the media's enrolment in the network is important but cannot be relied upon because it can never be stabilised, as the next big story will always come along to unenrol the media temporarily from the network; that is, until the influenza virus does something to make itself noticed again by the media (for example, by mutating into a novel virus transmittable by humans and/or by causing serious morbidity and mortality in humans).

In addition, to LHB official information and unofficial media reports, the views of other HCWs, which can be official, quasi-official and/or unofficial sources, and usually non-material, compete to be the hegemonic message on influenza vaccines. Informants reported that accounts from other HCWs can have a positive or negative effect on seasonal influenza vaccine uptake, as a KI at LHB B stated:

> *But as the years have gone by it's...because staff have actually told other people "well I've had the flu vaccine, you know, and I didn't have flu". It's just staff speaking to each other and giving feedback...I mean I think it's because if you have one member of staff in a department that's had the flu vaccine and they say that they've had flu from the vaccine, if that's a member of staff that is confident and will, you know, openly tell everybody, then you can't you know, then that staff is going to have a massive influence on other staff in they?*

Furthermore, this was also reported to be an issue during the pandemic, where colleagues' accounts of side-effects from the vaccine, and even reports that the vaccine could give you H1N1, worked to prevent other HCWs receiving the vaccine: '*So it was getting out there that this [pandemic] vaccine hurts and it gives you flu and so that causes a ripple effect'.* In addition, midwives at LHB B reported that 'misinformation' from other HCWs, and from the LHB itself, about the pandemic vaccine made it more difficult to insert the vaccine into willing vaccinees:

> *There was also I feel a lot of whispers and misinformation being bantered around amongst staff. I know it made uptake very, quite complicated, people were very wary of it, people were misinformed and that's my experience from medical and midwifery staff...And that it was a new vaccine, there wasn't enough information through the*

> *longevity to sort of consolidate sort of or deny that there was myths associated with it.*

Furthermore, that this was a particular issue for pregnant HCWs: *'They were being told if you're pregnant and a member of staff by medical staff "oh it's a live vaccine", which is you know, all this misinformation, "don't have it" and you know just lots of banter around really and staff were, it was difficult to get staff up there'.* In addition, misinformation came from doctors at both LHBs; as a midwife at LHB B reported:

> *And the doctors would give it [the pandemic vaccine to the pregnant clients]...a lot of the girls [i.e. midwives] were asking medical colleagues because we work very closely together, we're friends and colleagues and I think a lot of the medics were saying "well we haven't had any". You know, there were some that had, some that hadn't. And people were asking all around, people were going everywhere "well have you had it?". They were trying to make their own decision and I know a few of them, doctors, had said "no"...people that had been here a while, which I know the girls on the ward, the midwives and support staff looked up to those and thought "ooh well if they're not having it, why aren't they having it? They must know more about it than me".*

This is important because doctors are often regarded as a trusted source of information by other HCWs. The role of other HCWs as a trusted source of knowledge is important because as Yaqub et al. (2014: 7) recognise[104]:

> It is not vaccines per se that are mistrusted, rather it is the institutions (through which information about vaccines is delivered) that are mistrusted. Information does not

[104] This was also considered in Chapter Five, where a non-OH vaccination champion proposed that they are a more trusted source of information than OH and other LHB actants.

always speak for itself and social context shapes how information is interpreted and used (Brown and Duguid, 2002). As such, information in itself is not as important as the institutions involved in its curation and delivery (Johns, 1998).

However, HCWs, including doctors, who are not specialists in influenza may not have sufficient knowledge to be able to advise colleagues appropriately about their vaccination choices. Moreover, official messages were reported to be an issue during the pandemic: '*So it was miscommunicated I think, by the health board'.*

Given the proposed importance of HCWs' perspectives of influenza immunisation, what are these accounts? The next section considers these.

Healthcare Workers as a Target Group for Influenza Vaccines

Calman (1998) proposed that the policy inserted into the UK healthcare network of prioritising 'at-risk' groups and older people for influenza immunisation may explain nurses' reluctance to be vaccinated against influenza. Informants were aware of the other 'at-risk' groups (e.g. those with some chronic illnesses or over the age of 60) and fifteen years later, there still seems to be confusion around offering influenza to 'young' and 'healthy' HCWs, as a KI at LHB A testified: '*And the other issues that came back to the group was that "well the seasonal flu tends to be for specific groups and we're not the specific group, we're not over 65, we're not diabetic, we haven't got chronic bronchitis, therefore why do we need it?"';* and this also applied during the pandemic. For example, an ED nurse reported that she was surprised that young people were affected so seriously by H1N1: '*I think public perception is that old people...They were young, quite shocking to me. I thought it would be old people and*

babies'. Furthermore, that there is a lack of understanding of the concept of herd immunity: '*"I'm not in an at risk group", that sort of thing. People not really understanding that we wanted to create you know a herd immunity affect that would just prevent people transmitting the virus'.* This belief about herd immunity is also incorrect, as herd immunity is not considered a viable strategy for influenza vaccination[105].

However, some informants reported that this perception of not being in a risk group for seasonal influenza did not apply in the same way to the pandemic vaccine: *'I didn't fit in the criteria for seasonal, never have had it, didn't worry me, just had the other [pandemic] vaccine'.* Moreover, a KI at LHB B reported that HCWs did not feel that they were in a risk group for seasonal influenza immunisation prior to the pandemic, but that the pandemic virus has done work to mobilise them as influenza vaccinees, accepting both seasonal and pandemic vaccines.

Several informants reported that it was only when other health issues, or increasing age, became actants in their networks did they become mobilised as seasonal influenza vaccinees; even for OH professionals and other KIs. However, a nurse and midwife at LHB A also reported not accepting influenza immunisation prior to the 2010-11 season despite being asthmatic and suffering from a lung condition, respectively; so even where HCWs are in a 'risk-group' for influenza immunisation, this may not mobilise them to become vaccinees.

[105] Herd immunity is considered in Chapter One.

In addition, midwives reported that before the pandemic they believed it was unnecessary for them to accept influenza vaccines because their client group were not prioritised for pre-pandemic seasonal influenza immunisation: *'They [midwives] don't see the benefit of it for the [pregnant] women. Um so they don't see themselves as passing anything on, no. I believe that's why they [midwives] don't have it [influenza immunisation]'.* Furthermore, informants, including a KI at LHB B, reported that pregnant women were difficult to mobilise during the pandemic, because as was first noted in Chapter Four, there was competing information in the form of leaflets, being inserted into the net by non-LHB actants:

> *the information initially was quite conflicted, should they have it, shouldn't they have it, and then as more pregnant people were getting infected then there seemed to be a push on it. It was quite difficult to persuade the pregnant staff even by sharing with them how vulnerable they were, their thoughts were for their baby and not for themselves really. And they were just under this illusion that it hadn't been tested...It was quite difficult I found. Last year it was better. So, so we're quite a few years on now but the information seems to be getting out.*

The shifting definition of who is at risk from influenza, i.e. from seasonal to pandemic scenarios, for example, with the addition of pregnant women during the 2009-10 H1N1 pandemic, and more recently children, destabilises knowledge of who is at risk in the network.

In fact rather than being at risk of infection from their work role, informants, from medicine, nursing and midwifery, still maintain, post-pandemic, that exposure to infectious diseases during the course of their work strengthens their immune systems and therefore they do not

need to be vaccinated against infectious diseases, including influenza. Moreover, this was true even when KIs were aware of the protean nature of influenza viruses, as a doctor at LHB B recounted: *'You know working in the front line you know I think I've been exposed to most stuff. I just assumed I was immune, I guess. I know flu changes every year or two. But I've never caught flu before despite working in the front line for over 20 years'.*

Informants also proposed that other IPC measures, such as hand washing, means that influenza immunisation is unnecessary, as the previous informant from LHB B stated: '*My argument is, if they're adhering to strict infection control practices, whether it's blood borne viruses, whether it's flu and c diff etcetera, they should be adhering to their infection prevention and control guidelines and then they shouldn't be transmitting it from staff to patient'.* Thus demonstrating the failure to insert knowledge of the transmission methods of influenza and in opposition to the view of KIs in Chapter Five. In the 'Pasteurisation of France' Bruno Latour (1988) proposes that doctors had to accept a shift in their power to cure because of the introduction of preventive measures. Similarly, nurses may be struggling to accept that hygiene practices, from which they gain 'hygiene capital' (Samuelsen and Steffen 2004), cannot prevent all infections.

Therefore, the non-KIs agreed with the KIs' accounts in Chapter Five about the pandemic vaccination programme, in that the interessement of HCWs into seasonal and pandemic immunisation programme is 'negotiated in a context where alternatives exist that become more or less attractive depending on what' the immunisation programme has to offer, or at

least what it is perceived to offer, compared to what the alternatives have to offer (Cloatre 2014: 124).

While another informant from LHB B questioned the relative risk of HCWs transmitting influenza to patients, compared to non-HCWs: '*I'm not any more of a risk factor to them than anybody else they come into contact with. You know I don't sneeze in their faces, we wash our hands'.* In fact, midwives from LHB B taking part in a focus group proposed that transmission of influenza actually only flows in the opposite direction, i.e. from patients to HCWs:

> *I: So d'you see yourselves as vectors of influenza then for your patients?*
>
> *P1: No because we wash our hands regularly.*
>
> *P1: Um I don't, only because I think I'm fit and healthy...*
>
> *P3: I think we're more at risk from them than giving it to them.*
>
> *P2: I think that's true, I'm more worried about myself if I go into a house and there's coughing and spluttering and everything all the time. "Please don't give me anything now". More than me going into somebody's house.*

This could partly explain why HCWs are not as concerned about the risk of transmitting influenza to their patients as they are of catching it themselves or transmitting it to their families, as a paediatrician elucidates further: '*I hadn't really reflected that I'm a risk to my own patients, 'cos I just, I tend to think of the patient who has the flu, going in that direction...But I should have reflected. If I was worried about my family, I should have been worried about my patients as well'.* O'Reilly et al. (2005: 478) proposed that 'addressing this

misconception' may lead to higher immunisation rates among HCWs. However, some informants did report that they think they are a risk factor for patients/clients, as a midwife at LHB B stated: '*It's very hard on those vulnerable groups. Personally I want to protect them too. I do [think I'm a risk factor for my clients] because we're dipping in and dipping out of people's homes'.*

In addition, participants reported that they did not see themselves as being at risk of influenza as they are young and healthy and have not experienced symptoms of influenza, which is conceived by them as making you feel very ill as opposed to the common cold and other rhinoviruses and ILIs, which are seen as having milder symptoms than influenza. The majority of participants, including KIs, reported that they were unaware that you can have subclinical, asymptomatic influenza. When asked at the end of the interviews/focus groups "was there anything that stood out as particularly important that we discussed"?, the most common response was that they had not known that you can have a sub-clinical/asymptomatic influenza infection; as an ED nurse stated: '*the most important thing for me you've pointed out is perhaps carrying it and not having any symptoms yourself, and…passing it on to somebody you know you're looking after or a relative or a child, your children…';* and that this knowledge could persuade them to accept the vaccination in future, as an ED doctor reported: '*I mean the fact that I hadn't really thought about the fact that I might get flu and not have the symptoms and yet pass it on to somebody and that would probably make me much more likely to go and get the seasonal flu vaccine...'.* The same doctor seemed not to have previously considered the susceptibility of their patients to influenza: '*the fact that you can be asymptomatic and pass it on then. 'cos I suppose I am seeing potentially vulnerable people*

aren't I, who are already ill or immunocompromised or immunosuppressed'. Even a KI a LHB A reported that they had not been aware of this issue and that this knowledge could mobilise HCWs as vaccinees:

> *the one thing that really stands out for me in terms of raising my awareness is perhaps my lack of understanding that nurses can be out there in the clinical area with the flu but not know they have it. So that's really new for me because I wasn't aware of that. So I think that's really important. Because I think if we get that message across, I'll be speaking to [a colleague] now, if we get that message across that will give a bit more ammunition to our campaign. I don't think they'd be aware of that. So that's really important.*

So the influenza virus has failed to mobilise HCWs as vaccinees partly due to its unstable nature in the form of variable effects on human hosts.

However, a paediatric nurse compared asymptomatic carriers of influenza viruses with those of meningitis and proposed that in both cases it is not appropriate to employ preventive health measures: '*I mean it's similar in a way then to the fact that most strains that cause meningitis are, I mean 15 to 18% of the population walk around as carriers asymptomatically anyway. We can't really go round and give everybody...constantly um just to combat that'.* Furthermore, the same informant questioned the probability of catching influenza from asymptomatic carriers of the virus: *it's that chain of the likelihood of me picking it up from somebody who's asymptomatic, who's picked it up from somebody who's asymptomatic…'.* Again, displaying the failure to insert knowledge of transmission of influenza into HCWs: '*you*

know how likely is it that 4 or 5 links of people within my, that I'm close enough to, 'cos that's who I'm going to get it off aren't I?'.

In addition, some informants argued that they are not a risk to patients because they do not come to work when they are ill, even when they were aware of the pre-symptomatic stage of the illness, as a paediatric nurse stated: '*But if I developed a cough or a cold or anything, I would go off sick, not to bring it into work. Um I mean I know there's always that period where you, you know you're carrying something before you show symptoms yourself'.* So knowledge of asymptomatic and pre-symptomatic spread of influenza does not always mobilise HCWs as vaccinees.

Therefore, defining HCWs as a risk group for influenza immunisation, or a target group for influenza vaccines, is not always sufficient to accomplish the mobilisation of HCWs as vaccinees. The enrolment requires something else to happen. What this is is the subject of the remainder of the thesis.

Influenza as a Healthcare Associated or Hospital Acquired Infection

The informants' views that they are not a risk to their patients and that they do not transmit influenza to them also means that the majority of informants reported that they did not view influenza as a hospital acquired infection (HAI), or healthcare associated infection (HCAI), in the same way that other diseases are, as even an OH professional testified:

Again it doesn't sort of stick out there right there at the top, this is a hospital acquired infection. If you mentioned MRSA, Clostridium Difficile and influenza, they would probably almost certainly go for the first two, they wouldn't worry too much about influenza because there are other things, beta streptococcus, which again tends to be on neo-natal units, midwifery units. Yes it's there but it doesn't have such a high profile. No you know, this is a community illness which people bring in to the hospital.

Instead, informants stated that they perceive influenza to be part of the community network rather than the hospital network:

it's a community problem that's brought into hospitals. I don't know if that makes sense...Because the community are coughing and spluttering on the door handles and you're coming to visit and you're going up and down in the lift and coughing and sneezing. People don't stay away even though we ask them to. Um and our staff live in the community...You know it's very um opportunistic isn't it, people are run down and have got other infections going on as well. It hijacks so it becomes a hospital problem.

This was also reported to be the case for some peripatetic HCWs, i.e. community midwives:

Community. It's just it's concentrated if people are in hospitals 'cos of your level of exposure. But if you think about the community setting they're [midwives] vulnerable, they're in the homes of vulnerable individuals all the time. It's community you know, it's a community infection isn't it? They're hospital based most of the time so yeah I don't think they see it as hospital acquired.

Furthermore, that this was also the case during pandemics:

> *a pandemic is spread by transmission, not in hospitals but in the community... epidemics happen but only a teeny minority of patients ever come to hospital...we spread viruses but flu is not, whether there were hospitals or no hospitals, flu epidemics would happen...The deaths from flu epidemics would happen and always have happened, so I don't think health workers are the source of these problems.*

Some informants, including this paediatric HCW, proposed that it had never entered their consciousness that pandemics can be HCAIs: '*My feelings have always been that the pandemic it's widespread anyway you know. But I guess we do have a part we play in preventing the spread. And it's not something I've previously thought about'.*

These accounts concur with Brown and Crawford's (2009: 506) observation that, `The hospital is decentred as a source of infection' and that this 'mitigates the responsibilities of hospitals and statutory health care providers and turns the risk back towards the individual as a responsible actor in an ecology of mutation'. A KI seemed to recognise this as well: '*And it's almost as if well it's somebody else's sort of problem. The majority of our staff are the community because they live here, and they live locally and their children go to local schools and so they are the population, the community'.* Moreover, a nurse manager at LHB B reported that this idea was reinforced to staff during the pandemic in an effort to assuage their concerns about treating patients with H1N1: 'E*xplaining to staff that they're probably more likely to catch it in Tesco's than they were looking after a patient with precautions, so uh, I think, I think their fears were allayed then'***.** So influenza viruses, including the pandemic H1N1 virus, have failed to insert themselves sufficiently into hospital networks to be able to mobilise some HCWs as vaccinees.

In addition to not perceiving influenza as a HAI/HCAI, informants also proposed that HCW influenza immunisation is not an IPC issue because patients transmit influenza to HCWs (and not vice versa), as a paediatric nurse stated:

> *because I can't get my head around, I can't see it being that I'm not going to have the flu to give it to the children in here, I suppose yes if you viewed it that way then yes it would be part of infection control procedures...To us it was more of an infection control problem that we had these children coming in in the first place. So we needed to have the vaccine not to take them home. We weren't going to stop, I didn't feel we were going to stop any children from having H1N1 by us having the vaccination. It just did seem to be the opposite way round.*

Influenza vaccines have also failed to insert itself into the IPC champion role, with the HCW influenza immunisation champion being a separate responsibility.

Why Healthcare Workers Accept Influenza Immunisation

Following on from the idea that influenza is not a HAI/HCAI, the majority of informants who reported that they had accepted influenza vaccination stated that they did this in order to protect themselves and/or their families rather than patients; even where the patients are children:

> *It's yourself first isn't it, myself first.*

> *I don't think that the girls [paediatric nurses] have it to protect the children on the ward, they have it to protect the people outside. I really do think it's that way round.*

Furthermore, informants reported that their motivation for having the pandemic vaccine was the same as for seasonal influenza vaccines, that is, to protect themselves and their families, rather than patients, as a midwife at LHB stated: '*I remember thinking sort of I didn't want to be ill because I didn't want to take it [H1N1] to a family member that was poorly. A safeguard...I think if I'm honest it was to protect my family'.* Previous research (for example, Hoffmann and Perl 2005) has found that emphasising the protection of patients can help to mobilise HCWs as vaccinees. However, OH informants reported in Chapter Five that they had attempted to increase uptake by focussing on the protection of HCWs and their families, rather than patients.

Some informants, including a paediatric HCW at LHB A, further questioned the LHBs' motivations for wanting HCWs to be vaccinated against influenza: '*I just wonder how much that is just a political thing to say they've managed to get compliance amongst the work staff, "we've done something, we've got all the staff". So it's, therefore, if somebody's caught it you haven't caught it from our staff, you know'.* Other informants questioned why the LHB was trying to insert pandemic influenza vaccines into its HCWs, including a paediatric HCW at LHB B: '*It's more about keeping us fit enough to work*'; and a midwife at LHB B: '*I feel there was a lot of "we must get all this done to tick a box" more so than any other reason'.* So reporting of uptake can also have unintended consequences for HCWs' trust in the immunisation programme and could actually work to stop HCWs being mobilised as vaccinees.

In addition, informants, including a paediatric nurse, suggested that side-effects from an influenza vaccination could result in them having to have time off work for an illness that they might not have got anyway:

> *Murphy's Law is, I don't have time off, I'm never sick, but you're giving me something that would make me sick [laugh] and then I'd be, the irony being would they, can I ask for a medical suspension because I did it for the good of, not to go down as a sick episode...So you can be making me ill, have days off sick, which I don't take and something that might not even, you know.*

Again, here, the reporting practice, this time of a sickness episode, seems to be the more important actant, rather than not being available to work per se.

Furthermore, several informants expressed concerns around long-term side effects from influenza vaccines, including an OH professional: '*some of the very rare risks…Guillain Barre complications and sort of widespread arthritic problems'*; and cancers, as a midwife at LHB B conjectured. In addition, some informants reported that concerns about the safety of the pandemic vaccine, particularly having it at the same time as the seasonal vaccine, did work to unenrol HCWs from the seasonal network, as a midwife at LHB B stated, respectively: *'I think that people also went ahead normally and had seasonal flu, I think it stopped them having seasonal flu vaccine as well. Because they said well if it means two I'm not having any. There was reports of that'.* This may have been because of reports from other HCWs that having the two vaccinations at the same time made vaccinees ill; as a nurse at LHB B proposed: '*As for the vaccine, I think, in 2009 the uptake was poor and because it was two vaccines at that*

time people that were having it they did become ill and um, but word of mouth then people were put off having it'. The same informant reported that this was not an issue in the immediate post-pandemic season: *'Then 2010 the uptake was better, there was only one vaccine'.* In addition, several informants, including a midwife at LHB B, reported that the novel nature of the H1N1 influenza vaccine may have worked against mobilising HCWs as vaccinees: '*it is the newness of it and you know the same with everything, you want to make sure it's safe'.* This extract also demonstrates a failure to insert knowledge into HCWs about the annually novel nature of seasonal influenza vaccines. Furthermore, a senior midwife proposed that HCWs believed that the H1N1 pandemic influenza vaccine was a 'live' vaccine and that this belief worked to discourage HCWs from being mobilised as pandemic vaccinees:

> *I think people got frightened with the H1N1 vaccination and a I do believe they thought it was a live vaccine for a start and um b because of the severity of it, I felt it just frightened people and they didn't know whether um it would be beneficial for them or not, so they...Because they felt like they might get that from the vaccine... They thought it was rushed through. "How could it have been tested fully? What are going to be its side effects for future years?". Especially the younger population.*

Influenza viruses, in the form of vaccines, have, therefore, partly failed to mobilise HCWs as vaccinees because of the unwanted effects of immunisation, which are sometimes inserted into the net.

In addition to concerns around the off-target effects from influenza vaccines themselves, some informants also expressed dislike of the hybrid actants involved in inserting the vaccine

into them. Several informants commented that HCWs are no different to the general population, they are part of the public and like non-HCWs they can suffer from needle phobia. A KI at LHB A and a vaccination champion at LHB B proposed that the use of intranasal influenza immunisation would help to mobilise more HCWs as vaccinees but that the cost was prohibitive: '*I mean you always get individuals who don't like having injections either do they, they're scared of injections...The liquid ones are really expensive. If it could be delivered in a different way to having injection, I'm sure that would increase the uptake'.* Therefore, it may be easier for a vaccine to cross the nasal, rather than dermal boundary, even with HCWs. However, some informants reported that the H1N1 virus did work in their network to make the pandemic vaccine more acceptable to them as compared to the dislike of having an injection.

Furthermore, informants, including a vaccination champion at LHB B, stated that HCWs' perceptions of influenza as a serious illness has changed since the pandemic due to the work done by the pandemic influenza virus and then by HCWs mobilised by H1N1:

> *initially in 2009 I don't think they took it seriously, um, but uh, it was drummed into them then by myself and [a colleague]. But I do think that because of the deaths that occurred, I do think they do think they are at risk...I think people take it more seriously now. They just thought "it's just a cold" before. But those that did experience symptoms prior to vaccination they um they said how different it was, the symptoms.*

Informants proposed that the A(H1N1)pdm influenza virus inserted more awareness into the HCW network and that this resulted in HCWs being mobilised as vaccinees, as an obstetrician

at LHB B stated: '*It raised awareness. I never had it before and I never saw it as a problem and I thought if I got flu I'd be alright anyway'.* However, a KI at LHB B reported that the work of the H1N1 virus did not have an immediate effect on vaccine uptake and that it was in the following influenza seasons that it managed to mobilise HCWs as vaccinees:

> *By comparison the year after, staff had seen the year before that people had died, you know, they, they'd heard these stories, they'd seen all these things and so for them all of a sudden we got an increase in interest...I think it has made a massive difference and I think before the pandemic people didn't get it, after the pandemic they do.*

A vaccination champion at LHB B reported that this mobilisation included midwives: '*I would say 2010 to 2011, it was very, the uptake was increased because they'd [midwives] seen it the year before and therefore they weren't willing to I suppose expose pregnant women any further than they already were'.*

In addition, several informants, including an OH professional, proposed that the presence of the H1N1 strain in the post-pandemic vaccine is continuing to mobilise HCWs as vaccinees: '*they tend more to take the seasonal flu now because they know the H1N1 is in it...I think most of it is really because they know the H1N1 virus is gonna be in the seasonal flu every year. And I think that's why they want to take it up'.* However, a KI at LHB A conjectured that the presence of the H1N1 virus strain in the post-pandemic vaccines may have actually worked to staunch the flow into some HCWs, if they had received the pandemic vaccine, because they do not realise that they still need yearly post-pandemic vaccination due to the mutability of influenza viruses. Furthermore, some informants' mobilisation as vaccinees has yet to be

stabilised post pandemic, as an obstetrician reported: '*I did a few times, not every year but a few times'.* Moreover, some informants testified that even post pandemic HCWs do not take influenza seriously, including an OH professional: '*I just became complacent. I thought do I have it or don't I?'.* The previous OH informant reported that it was only when they caught influenza (or an ILI) that they were re-mobilised as a vaccinee: *'But you know I've learnt my lesson. So I will, I intend every year to have it'.* A paediatric nurse asserted that they turned down the offer of immunisation because the effectiveness of influenza vaccines cannot be guaranteed: '*nobody gave me a good enough reason…So it partly protects you from one of the most common causes, common strains, but it's no guarantee'.*

In addition, a vaccination champion reported that even being in a risk group has not stabilised their enrolment post-pandemic: '*I've had them periodically...Just because the years go by so quick and I forget about it and before I know it it's the summer again'.* A midwife agreed that constant works needs to be done to keep the programme in a HCW's knowledge assemblage: '*So you think "Oh well I got away with it this year" so then next year you forget it and it loses the momentum doesn't it?';* and, an obstetrician at LHB B reported that access to vaccines and vaccinators is still an issue post-pandemic: '*I had the vaccine last year but this year because the clinics didn't coincide with my, you know when I was available so I didn't have the vaccine this year'.* Similarly, midwives taking part in a focus group at LHB B maintained that the lack of seasonal vaccines in the network in the year following the pandemic lead to them being unenrolled from the vaccination network:

> *The feedback following that was "oh in some areas there was some [influenza vaccine] that went out of date, because it was stockpiled, wasn't used" and then you feel*

cheated. Well why wasn't that utilised in the area where you ran out because there were people that were turned away and then you feel a bit cheated then because you sowed the seed and tried to make everybody very positive about accepting it which dispelling their myth which was quite a feat and then you sort of...It's like sort of saying you can have a chocolate when you've done all your work then the chocolate isn't there...they think if it's, "well they let me down the last time so why will I bother this time''.

In addition, the pandemic influenza immunisation campaign, for both HCW and risk groups, may have been too successful in terms of controlling the pandemic and this may have negative consequences for mobilising HCWs as vaccinees post pandemic, with some informants, including an ED nurse, commenting on the mild nature of the H1N1 pandemic: '*my perception is, is that...maybe as a result of vaccination, I don't know, um the pandemic didn't materialise to the extent what we were led to believe what was going to happen'.* Similarly, a paediatric HCW proposed that a more severe pandemic may have mobilised more vaccinees: '*if it had ended up being much, much bigger, more sick people, possibly more staff would have [accepted the pandemic vaccine] but um it didn't seem to hit us as big as we thought';* and that H1N1 failed to mobilise HCWs as vaccinees because it did not cause as many deaths as the 1918-19 'Spanish flu' pandemic: *'when you think how many people were killed after the First World War, yeah terrifying. But I don't think we've ever seen it on that scale since, so people can be a little bit blasé about it'.* The worst case scenario is that HCWs and the general public believe that the government and/or the media was 'crying wolf', which could have devastating consequences for a more 'serious' influenza pandemic in the future.

Despite the mild nature of the pandemic, a senior midwife at LHB B reported that a significant number of midwives took sick leave during the pandemic (despite not being sure they had H1N1) due to work done by other health professional human actants, GPs:

> *I also had members of staff ringing in to say they had a sore throat, they thought it was the start of something and their doctors, their GPs. This is what I think GPs um were doing as well. Erring on the side of caution and telling they might or they might not and you'd better not go into work and it did cause chaos. Especially when you're trying to run an area you know that is understaffed anyway and then on top of that you've got staff being told by their GPs that they'd better you know not to go into work, they might. So it's, it affects, it spreads out doesn't it, it's this big picture.*

So while the mild nature of the H1N1 virus meant that it failed to mobilise some HCWs as vaccinees, the pandemic was serious enough to mobilise some HCWs as sick patients, too ill to work. However, a paediatric HCW at LHB A reported that few paediatric nurses were on sick leave with H1N1 during the pandemic.

Healthcare Workers' Experience-Based Knowledge of Influenza

In opposition to the view that inserting second-hand, learned knowledge, in the form of official and non-official messages, is important in order for influenza viruses to mobilise HCWs as vaccinees is the perspective that direct personal experience-based knowledge (or in ANT terms, association) is a more important actant, as previous research states: 'Personal experience and knowledge has been shown to be central to the understanding and

acceptance of health promotion, advice and interventions in relation to other conditions (Pill and Stott 1985; Davison et al. 1991)' (Telford and Rogers 2003: 744).

Some informants, including a midwife at LHB B, suggested that direct experience-based knowledge of influenza viruses mobilises staff more than second-hand, learned knowledge in the form of official messages: '*I still don't think it affects you unless you know somebody who's been affected by it though... I'd have to see somebody with it for it to really hit home for me';* and that during the pandemic, it was first-hand experience of patients/clients very ill with the pandemic influenza virus, rather than the immunisation campaign, which mobilised them as vaccinees as midwives reported: '*they could see how ill these women were and also nursing them was a risk and I think that did move people. Certainly it did with my staff, moved them to think "yes I will go and get it [the pandemic vaccination]"'.*

A related point was made by a KI at LHB A, who proposed that larger hospitals and LHBs which have more critical patients and therefore more experience with, and awareness of serious influenza infections may have greater uptake of vaccines among HCWs. For example, LHB A does not have its own paediatric intensive care unit (PICU), so more serious cases have to be transferred or directed to a neighbouring LHB hospital. Informants at both LHBs reported low numbers of children ill with H1N1 during the pandemic, as an ED doctor at LHB A reported: '*we were actually quite fortunate that the paediatric group didn't actually trigger our local PICU into their full flu plan. We didn't see that many very sick children'.* Furthermore, a paediatric nurse suggested that because paediatric intensive care is centralised in one

particular LHB[106] in that region of Wales, then the other LHB paediatric departments did not have direct experience of children seriously ill with influenza and that this may have a negative effect on HCW influenza vaccine uptake:

> *I see them coming in with it [influenza], not picking it up here and going home with it...We're really quite lucky here, we don't get the hospital acquired infections that we see on a lot of the adult wards. So that has never really been a huge problem for us...I can't get my head around, I can't see it being that I'm not going to have the flu to give it to the children in here...to us it was more to stop us getting it. To us it was more of an infection control problem that we had these children coming in in the first place. So we needed to have the vaccine not to take them home. We weren't going to stop, I didn't feel we were going to stop any children from having H1N1 by us having the vaccination. It just did seem to be the opposite way round.*

This may have been exacerbated by H1N1's failure to distinguish itself from other respiratory conditions. However, a paediatric HCW reported that the cause of the paediatric patient's illness was unimportant: '*We see winter months as a risk for young children with any respiratory condition. So to us it didn't make any difference if it was the RSV virus or it was H1N1, you still had these sick little babies coming in'.* Were these factors in the failure to mobilise paediatric HCWs as pandemic influenza vaccinees? However, another paediatric HCW put forward a different pandemic experience; that H1N1 competed successfully for HCWs' attention:

[106] That particular LHB is not being considered in this study, even though it had the same vaccination profile as LHB A, because it is not comparable in terms of case mix, and also size of major hospital.

meningitis was not talked about for like a month...this [H1N1] was the big flavour of the month, this was money and resources and staff were being spent on...it was a big operation we had going. A lot of time and effort with staff for what turned out to be for a few kids that weren't very ill, were all negative...MRSA disappeared, which I'm sure it didn't but it wasn't talked about, and C Diff...That just disappeared off the planet for a couple of weeks, 'cos they're always the flavour of the month. No, nothing about MRSA, nothing about C Diff, it was all about [H1N1] you know.

Peer Pressure and Social Norms

Health professionals working in paediatric and obstetric settings may have a different, even unique perspective on influenza vaccination because part of their role is to routinely recommend influenza and other vaccines for children and pregnant women, respectively. Similarly, health professional managers may recommend[107] influenza immunisation to their staff. It may be, and has previously been (Poehling et al. 2001; Isaacson et al. 2009), argued then that managers and paediatric/obstetric HCWs are role models for their staff and/or patients/clients, respectively. A larger number of senior health professional informants reported that they accept influenza vaccines in order to be a good example for their staff. However, it was also maintained that sometimes seniority does not ensure mobilisation as a vaccinee: '*although we had quite a few medical staff vaccinated this year, but that tended to be junior ones, the most senior ones...they think they're invincible'.* This statement is in opposition to those previously considered which reported that older HCWs, and I assuming

more senior, were more likely to be vaccinated, and that this was partly to protect elderly parents and/or young grandchildren.

This lack of mobilisation may in turn have an effect on other HCWs' decisions around vaccination, because doctors and senior nurses may have significant influence on more junior colleagues' decisions around whether to accept influenza vaccination. Peer pressure was also reported, including by a KI at LHB A, to be an important facilitator: *'Certainly having it in the department and allied to somebody actually going round and asking people "have you had your jab?"...you just don't do it do you unless somebody is in your face'.* Similarly, a KI at LHB B recounted that other HCWs, particularly more senior HPs, working in the same work site have a key role to play in mobilising HCWs as influenza vaccinees:

> *I do think that there is something around leadership and the role modelling that that affects it, and if people are in an area where no one else has had it and where say the Ward Sister or the Team Manager doesn't get it and doesn't see why they should then they're going to say those things and if you're talking about it in a negative way then you're not promoting it...There were some wards that stood out...And I think that when you get a cluster you tend to get it that maybe the ward sister hasn't and therefore doesn't encourage it with others.*

Other informants also proposed that this can result in peer pressure and/or social norms <u>not</u> to accept influenza vaccination: *'it's only the people that are negative about the vaccine, who don't want it and you know are adamant they don't want it. And I mean if they've got an influence over a member of staff and you know that staff takes notice of them then they'd*

listen to that staff'; this also includes from managers: *'If the ward manager says "oh you're not giving me that" we find that the rest of the team are kind of maybe a bit reluctant'.* In particular, ward managers may be able to exert considerable peer pressure as to whether influenza vaccination is seen as a good or bad thing on wards and also have the authority to allow or not allow their staff to attend vaccination clinics during work time, as a senior nurse stated: '*We wouldn't allow them to go up during the shift...By the time they go up, they you know recover after and come down; we couldn't spare staff for that length of time'.* In addition, doctors were highlighted by a doctor at LHB B as being a particular group among which access and peer pressure are enablers:

> *I think if they came around they [doctors] would likely feel a bit on the spot and say "alright then"…They won't go to Occ health...Peer pressure but convenience...If in the seminar room there this morning someone was there for an hour, within a minute this whole floor would be buzzing with "you can go and have your", everybody would go in there, it just would happen. So, it's just convenience I think.*

Furthermore, due to the organisational hierarchy in hospitals, with doctors having higher status, nurses may be unable to influence doctors in their decision making around influenza vaccination; whereas doctors may feel more entitled to question nurses about their vaccine uptake as a paediatrician reported: '*I had to be fairly tough with some of the nurses' respiratory team in the sense of I suppose I was looking out for my patients, if my respiratory team are going out, seeing patients'.* However, the work done by this doctor did not always result in the nurses' mobilisation as vaccinees, as the same informant testified: '*But there are*

some people on the general paeds side who were just as forthright in telling me where to go about that. They weren't going to get flu vaccinated'.

Perceptions of Other Healthcare Workers' Mobilisation

Like the previous informant, on the whole, informants identified other health professional groups as not accepting influenza vaccination, rather than their own profession[108]. Nurses and midwives highlighted physicians, and doctors pointed to nurses; as an OH professional and paediatrician commented, respectively:

> *there was a grand round and one of the doctors did a flu update for doctors, couldn't get them on that grand round to be vaccinated. They would walk past me.*

> *In terms of health provision though, I was worried about the poor uptake of nursing staff of the flu vaccine [during the pandemic]. There's a lot of magical thinking about vaccines...I'm assuming that the doctors are vaccinated.....I don't think it's the doctors you need to convince, it's the nurses seem to be far more... Yes I think you would, do think you need, if you were going to put any resource anywhere I think nursing. Nursing conception, you know ideas around risk benefit of flu vaccine would be a good way, a good place to start.*

[108] I think it is pertinent here to underline what I said in Chapter Three about the status of the informants' accounts which were generated in the interviews and focus groups. I do not ascribe any veracity or falsity to such claims. The informants are also entangled in other networks with their colleagues and this could have a bearing on the accounts given here about another network.

However, the previous informant acknowledged that medical colleagues may not divulge their vaccination status to senior doctors: '*But then I suppose the doctors would keep their own counsel rather than tell me...They wouldn't want to you know because of the way the hierarchies work perhaps'.* In addition, some informants did identify their own professional group:

> *the doctors were a bit difficult to reach [during the pandemic]. It's been easier this last year but the year before a similar kind of, a bit of resistance, it's not really a priority, "do I have to get this?".*
>
> *there's certain groups of staff that you struggle to hit and sadly a lot of those are nurses, which I find difficult as a nurse.*

A KI at LHB B proposed an explanation for doctors' non-acceptance of influenza immunisation:

> *It may well be that if you look at it from lifestyle, a lot of the medical staff would not have the associated lifestyle factors of being grossly unfit, smoking, excess alcohol. So the chances of them being troubled with chest infections would be low. Again thinking back to where we are in the present time, the number of medical consultant staff that I see in my clinics for assessment of illness or returning to work after illness is very, very small compared, probably less than .5%, whereas some divisions you can get nursing staff levels of absence from work due to illness as high as 10%. Those are huge, huge, huge, huge differences so there's got be something and I don't think it's genetically that doctors are a different breed. I think it's very much it may well be associated with lifestyle factors, 'cos smoking is still an issue.*

However, a non-medical KI put forward a different explanation: '*You know what doctors are like, the more qualifications they get the more immune they are, that's what I say about it. Just passing your surgeon's exams does not give you immunity to flu'.* Similarly, Roth (1957: 312) found in a study about a tuberculosis hospital department that 'the use of protective clothing is inversely related to occupational status level. The people of higher rank seem to have the privilege of taking the greater risks…'.

Influenza Vaccines' Access to Healthcare Workers

Hospitals have been described as 'turbulent' (Melia 1979; Allen 2004) work environments. Informants proposed that the unpredictability in these settings has a negative impact on HCWs' ability to accept influenza immunisation during work hours: '*being released from their work to do it. Obviously it's unpredictable in lots of jobs'.* Informants proposed that convenience of vaccination clinics in terms of physical location and timing are important factors in whether they accept influenza immunisation, seasonal and pandemic, as a paediatric nurse reported of the pandemic programme:

> *They came around and did mobile clinics, it was on the weekend as well, which I thought was really, really good because they caught a lot of staff that they probably wouldn't have before...I think it's helped the fact of the mobile clinics...I don't think if it hadn't been on site and there in front of them that they would have gone and made their way out of the way to go and do that. 'cos a few of the girls said "ooh I've had the flu vaccine this year. They were here and I thought I might as well have it been as*

they're here". So I think making it more readily available and on your doorstep that way is easier for health professionals.

So accessibility is not just about physical location of the mobile vaccination clinic but also the days at which it is held, i.e. weekends. Another informant highlighted the need for clinics at different times of day: '*This year...in the ward area they were doing it in the evening'.*

In terms of temporality, it is also important when in the influenza season or pandemic vaccines start to flow into HCWs through vaccination clinics; both in terms of delivering the programme in a short period of time and in terms of providing protection, to staff, their patients and the wider public, as soon as possible. As KIs in Chapter Five stated, several non-KIs at LHB B agreed that they thought the pandemic campaign had started later than it should have done and that this had an effect on vaccine uptake by HCWs, as a vaccination champion stated: '*I think it seemed a panic, sort of knee jerk reaction at the time. It was all sort of left to the last minute and then a big sort of we have to get everybody through now sort of thing, wasn't it?'.* Several informants concurred with the previous informant that this meant that the pandemic vaccines, therefore, had to travel faster into HCWs in order to reach them in time to limit the transmission of H1N1: '*Yeah it was late starting, um well filtering through I feel. Especially to the staff and as a lead or a manager it was difficult to get the staff in a small time through to Occ Health because of work commitments...I think had we started it earlier it would have been more successful'.* Moreover, that this escalation of flow speed of vaccines could have resulted in fewer HCWs being vaccinated because a social panic was created among staff:

> *I just feel that um prior to this [pandemic] I don' think there'd been a slow build-up of the information. I think it was just it was here, bombarded and why were managers or Lead Midwives and senior managers and everybody trying to push us into…It was a big panic um and I think people were frightened of the panic.*

In addition, the late flow of vaccines in LHB B meant that HCWs were concerned about suffering vaccine side-effects during the winter holiday period:

> *It was a very late uptake in the first year...I think it was in the December. Only because I vaguely remember people saying "Oh I'm not having it [the pandemic vaccine] because people have become ill and I'm not going to be ill over Christmas". So I think it was the early, mid-December...The negatives for 2009 would be that I think the campaign started too late.*

However, other informants did not agree with this assertion, including an informant working in the same department as the vaccination champion quoted immediately above:

> *I think as a health board they were pretty much on the ball about getting the frontline staff immunised straight away...As far as the department was concerned, we had lots of people as possible flu...it felt like it was early enough. I felt like I was ready for it when it came...I can't remember the time frame but I didn't feel like it was a last minute thing. 'cos I think it was co-ordinated by one of our nurses here who has a dual role in major incident training...She organised it all from that point of view, so you know it felt in a timely fashion. But I don't really know the ins and outs of how long it takes for you to build up your immunity, you know to be effective...so plenty of time then probably.*

Other informants, including a midwife, agreed that it is difficult to find the time to have a vaccination while on duty: '*Get two minutes to go and get it...When you're running all day it is hard'.* Furthermore, some informants, including an emergency doctor, reported that HCWs do not have the time to consider their own health because they spend so much time looking after other peoples': '*I think the problem is, is that generally we're all busy, you don't tend to think about your own health'.* This raises the question of whether HCWs should be able to access influenza immunisation during work hours, since they are being asked to accept the vaccination as part of their professional role[109]. A midwife at LHB A reported that the OH department had asked her to receive her immunisation from her GP because she was in a high-risk group; but she was unable to do this because it was difficult to fit in a GP visit due to the working hours of HCWs. She also highlighted that it would have entailed attending the GP clinic for vaccination on her day off and she proposed that this was an unfair expectation given that she was being asked to accept influenza vaccination in order to carry out her professional role. Some staff who are not in a risk group have also been expected to access vaccines from Primary Care in their own time: '*especially this year when you have to go to the GP to have it, that was even worse'.* However, another senior nurse proposed that HCWs attending immunisation clinics during work time is possible if the flow of HCWs to the vaccines, and then back to the wards, was steady:

> *It depends if it was organised. When it's organised, well run then um and the best way it works...if they have it at certain times, between this time, 10 and 11 we are going to do the maternity staff. To send them on a rolling rota, one goes up, one comes down and it's much easier. Whereas when it was everybody, you know you don't know who's*

[109] The ethical issues around HCW access to influenza vaccines are considered further in Chapter Seven.

going to be there. It's a wait and then that's when it's frustrating for the clinical staff because you can't release clinicians [...] you know it has to be on a rotational basis.

Doctors and more senior staff, including nurses, may have more flexibility in their schedules giving them more opportunity to access influenza vaccination. For example, nurses and doctors have different temporal-spatial organisation of their work (Allen 2004). Doctors may work office hours more than nurses do. As for spatial organisation, nurses may be more ward or department based and less peripatetic than doctors. Therefore doctors may be more involved in the transmission of influenza but may also have more access to influenza vaccination due to the preponderance of immunisation clinics during office hours and access to mobile immunisation clinics being held in other departments/wards. Informants agreed that nurses in particular would benefit from vaccines travelling closer to them, i.e. through mobile vaccination clinics: '*So I think that really providing that access at ward level, at you know at events where there's lots of nurses, then I think that you will see the uptake improve'.*

Some other health professionals are even more peripatetic than doctors, with community midwives and paramedics routinely travelling outside the LHB premises, and therefore out of the range of vaccines' LHB network, in the course of their work (for example, to family homes). This may make it even more difficult for influenza vaccines to access HCWs at work, as a union representative and KIs at both LHBs reported, respectively:

'Louise Silverton, deputy general secretary of the Royal College of Midwives, said: "We encourage midwives and women to have the vaccine to help stop the spread of the

> illness in hospital and at home. It is often difficult for midwives and other healthcare staff to get to the places where employers are administering the vaccine, because they work long and unpredictable hours, often in the community away from where the vaccines are being given."' (Guardian 22/9/11).
>
> *I think that people who are out find it more difficult really. So community workers, people sort of more remote from things it's more difficult. We can't go to them.*

Again, it is non-medical staff that vaccines may have less access to: '*I would have thought that the doctors would have a better uptake than the midwives because they're in acute settings; midwives are all over the place [laughs]. They're out in the community'.* The lack of access to vaccination clinics even when peripatetic staff are on LHB premises was also highlighted as an issue: '*But unless we go in on the right days we don't catch them being there do we?'.* Attending vaccination clinics at the OH department was also reported to be problematic for peripatetic staff:

> *if they caught me on the ward and said "look everybody's there, you go in one after the other", I may sort of pop in and out without really thinking about it. If you've got to make an effort to go and even being out in the community and then having to go into Occy Health, that's probably why I didn't go and have it done.*

In addition, some HCWs coming onto LHB property but not employed by the LHB, such as paramedics may find it particularly difficult to access occupational influenza immunisation from their own organisation, as a KI at LHB B described:

> *during the pandemic [paramedics/ambulance drivers] they were vaccinated because they're in and out of our department at all time and we offered it to the ambulance*

service. This year they did their own vaccination programme...some of the crew asked for it and if they asked for it they were given it but it wasn't offered. I don't think the uptake was as good as the pandemic because they were doing their own and obviously that's at ambulance stations whereas perhaps because they're coming into hospitals so it's easier for them to have it here, I'm not sure.

Despite their difficulty in accessing occupational immunisation, community midwives at LHB B reported that they had been identified as a key resource in providing care to pregnant women in hospital if the pandemic had been more serious. They reported that senior figures in LHB B had planned to use community midwives to deliver a variety of services, that it was assumed hospital based midwives would be unable to do because they would have contracted H1N1 while working in the hospitals. Community midwives were not considered to be at the same risk of catching influenza in the community, despite the fact that, as is elaborated on earlier in this chapter, the majority of informants reported that they believe influenza is more of a community acquired rather than HAI, as a midwife at LHB B reported: '*They were going to keep as many women out of hospital as possible and the Community Midwives were going to look after everybody. That was one suggestion. And also the Community Midwives were going to come in because the staff in the hospital were going to be off sick'.*

Furthermore, medical students are identified in UK pandemic plans to act as frontline HCWs during a pandemic if required due to qualified HCWs being unable to work due to pandemic illness. Another KI at LHB B proposed that it was important for vaccines to target medical

students because students were not enrolled in the LHB network for long (but long enough to catch and/or transmit an influenza virus). However, only LHB B offered influenza immunisation to students at the time of data generation. The responsibility for vaccinating students is officially placed on their educational organisation, rather than the healthcare organisation in which they are undertaking their work placement training. This illustrates the indeterminacy of network boundaries, what I would call 'marginal actants' and what Star (1991) terms 'high tension zones', i.e. students, paramedics, agency/bank staff and contractors are working in the LHB organisation but not of the organisation. The formal boundary in this network, i.e. frontline LHB HCWs, which is inserted by the actants considered in Chapter Four (i.e. the 'Green Book' and CMO letters) is problematic because the LHBs depend on excluded groups, including students, for the delivery of their healthcare service. As previously highlighted, since the pandemic LHB B has chosen to extend the boundaries of the HCW influenza immunisation network to include all human actants working on LHB premises. Informants reported that this has been achieved through the Medical Director broadly interpreting the 'Green Book'.

Influenza vaccines' ease of accessibility to HCWs, in terms of physical proximity to wards and departments where potential vaccinees are working, also means that colleagues have the opportunity to directly observe the immediate effects of vaccination on other HCWs. Midwives at LHB B proposed that HCWs wanted to directly observe if other HCWs had serious side-effects from the novel pandemic vaccine before deciding whether to take it up, and that this observation was aided by the insertion of mobile vaccination clinics: '*you see people they're going, they're coming back, they haven't fainted*'.

Furthermore, some informants reported that their decision to accept pandemic influenza vaccination was opportunistic, due to the presence of mobile vaccination clinics, and that this continued to be the case since the pandemic: '*It was very easy for me, I hadn't planned it, they happened to be there'.* Mobile clinics were reported to be so successful because they can meet the LHBs' needs for workforce presence on wards: '*it was very good, Occupational Health, did little work stations where they were giving them certain days and we had it sent round to our areas so that we could slot in'.*

Several informants reported that the vaccines, vaccinators and vaccinees had to be flexible about when they would meet, i.e. drop-in clinics rather than appointments: '*it wasn't appointed, you just went in, if it was busy you walked away and came back again. So it was made available'.* That is, in the majority of cases at least*: 'In the last 2 years it was really easy, they came into my anaesthetic room...then they were in the coffee room and ITU the year after that. But then I didn't get anyone this year and I actually had to look it up'.* Midwives in LHB B taking part in a focus group highlighted that mobile vaccination clinics are important actants in inserting influenza vaccines into HCWs because OH services are based at a different hospital in their LHB. In addition, obstetricians at LHB B taking part in a focus group proposed that the OH department would mobilise more HCWs as vaccinees if they located mobile clinics at outlying hospitals for an extended period of time:

> *P3: I think it would make sense if they did their clinics and they were in the hospital in one place for a whole week so you always knew they were in the canteen at lunch time, all day actually.*

P4: Because doctors are not present all the time, and there's junior doctors as well.

Moreover, midwives at LHB B taking part in a focus group reported that vaccination champions can mobilise HCWs as vaccinees because of their proximity:

P2: She's good [the vaccination champion] and that helped immensely...you get covered in your own area and I think the very fact that she did it in the workplace where you didn't have to sort of walk too far from the department to you know get what you needed.

P3: I think it's good that there's a champion where she sort of comes to your area of working and ease of access has got to be a plus point.

However, obstetricians taking part in a focus group at LHB B did not express such positive views about vaccination champions:

P1: You have to remember that's fine to do it but they are missing out something else which their duty is when they're not doing that work and they're doing vaccinations. That's, that's not really...

P2: appropriate.

P1: appropriate...you have to sign a consent so there is a confidentiality issue as well. You don't want to be sharing your medical history with your colleagues, Occupational Health is fine.

P3: On the other hand if we actually had something worth finding we could go to Occy Health couldn't we?...

P1: But they may be pressurised to, to, to...

P3: And then they would lie on the form, yep.

Furthermore, some nurses and midwives testified that they would not be comfortable vaccinating colleagues, both in terms of the time taken to do it and confidence in their vaccination proficiency and knowledge. Nevertheless, some informants did see an extended future role for vaccination champions and other HCWs. A KI at LHB B proposed that non-executive HCWs are needed to be enrolled as actants on immunisation committees and more vaccination champions need to be enrolled in order to develop the immunisation programme so that more HCWs are mobilised as vaccinees in the future:

> *I think they would be more beneficial to engage clinicians, frontline clinicians, on their committees than have it be run by execs, in my own personal view…they need frontline staff to really understand the importance and I feel there should be champions in each service, at a variety of levels to really bring together and then they should come back because local information is more powerful...what I do believe is that certain people who are part of these pandemic flu organisation busting projects and so on, they do need more clinical frontline staff to really[...]We're never going to get any uptake otherwise. It's not going to improve. There's no point managers telling "yes you've got to do that". Unless they believe it for themselves they're not going to.*

In Chapter Five, OH informants complexified their role in mobilising HCWs as vaccinees. However, there was no consensus among non-KIs about the success of OH staff as facilitators of influenza vaccines either. Some informants reported that they felt that they have been

bullied into accepting vaccination[110] and OH informant even proposed that vaccination was mandatory on some wards: '*We had occasions of staff saying 'Yeah. I have to, my manager told me, I have to have it, I can't go off sick with a cold''*; while others testified that OH staff had pressured them to sign a declination form and, as outlined earlier in this chapter, some informants testified that OH actants do not have enough time to discuss the vaccination programme, particularly during the pandemic[111]. Furthermore, midwives in LHB B taking part in a focus group agreed, with KIs in Chapter Five, that OH services, at least in their LHB, are inadequate:

> *P1: Occupational Health, well within our health board, is in another hospital.*
>
> *P2: And there's a six week waiting list to go to see them.*
>
> *P1: Yeah. And it's, I have never in twenty five years used it...Yes I refer staff...if they refer themselves at the moment, it's quicker than if a manager refers. So there is a big wait there, it's not that accessible, it's off another site. Um and I think that's why people turn to their GPs really.*

Could this perception of OH services by non-OH LHB staff also affect attendance at OH departments for influenza vaccination?

However, some informants, including an ED nurse from LHB A, were positive about OH's mobilisation in the network:

[110] This was also reported of vaccination champions. The ethical around these issues and peer pressure from other colleagues is discussed further in Chapter Seven.
[111] I also discuss these issues in Chapter Seven.

However, I will say they're proactive because they're up and down the corridors vaccinating. I was grabbed in the corridor this time by Occupational Health [laughs]. 'I've got one left with your name on it', I'm sure she told everyone that, d'you know what I mean. So the encouragement is there. And if I ever didn't have a vaccine it would be because I never found the time. So them actually proactively looking for, victims I was going to say [laughs], looking for people, does make a difference.

Conclusion

This chapter has considered the final part of the journey of influenza vaccines into HCWs, including the insertion of messages (official and non-official) about influenza and influenza vaccines into HCWs' knowledge assemblage in order to mobilise them as vaccinees. Informants have highlighted the limitations of inserting official messages into HCWs, which may be helped and/or hindered by competition from non-official messages.

Where the insertion of knowledge may fail to mobilise HCWs as vaccinees, the proximity of mobile vaccination clinics may succeed. Other ANT studies (Novek 2002) which have considered the distribution of medication also found that it fails if it does not take into account the reality of healthcare work.

Even then, however, mobilisation of some HCWs may not be achieved. A KI proposed that multiple actants need to be enrolled in the programme in order to mobilise a heterogeneous population of HCWs as vaccinees: '*I think it's variable, I think it's like with anything isn't it,*

different things will light peoples' fire, different things will be the driver. And it's not knowing what those things are. So, we're all different'.

In addition to the heterogeneity of HCWs, the nature of influenza itself also means that different strategies need to be inserted into the net, i.e. this chapter in particular has shown that influenza is not an immutable mobile for HCWs, it means different things to different people, dependent upon their place in the network.

Inserting a mandatory immunisation programme into the network may work to mobilise more HCWs, where messages and availability of vaccines have failed. Mandatory immunisation, HCWs' ethical values as actants in the HCW influenza immunisation programme network and other bioethical issues around the HCW influenza immunisation programme are the subjects of the next chapter.

Chapter Seven

Values as Actants: The Bioethics of Healthcare Worker Influenza Immunisation

Introduction

This final empirical chapter considers the normative issues raised at all levels in the previous three chapters, and examines the ways in which values are enrolled as actants in, and the implications of this for, the network. I argue in this chapter, that these actants shape the narrative and network; and that the possible journeys for the vaccine and virus are shaped by the entry of these values, by constraining the paths available for influenza vaccines to reach HCWs.

The focus of the chapter is an examination of the journey that influenza vaccines take through the moral assemblage of the HCW immunisation programme actor-network, HCWs' ethical values as actants in the network and the bioethical issues around HCW influenza immunisation, including mandatory vaccination, the duty of care, the duty not to harm, the duty to treat patients, resource allocation and rationing of vaccination, and the gendered nature of this immunisation programme. In order to do this, the current bioethical thinking and empirical evidence from health professionals' perspectives on ethical issues involved in HCW influenza vaccination are examined. However, I have not included a conventional literature review of the bioethics of HCW influenza immunisation because what I am interested in is how bioethics manifests itself and becomes an issue in practice.

Like the previous three empirical chapters, this chapter employs the narrative of the vaccines' journeys. However, unlike the previous three chapters, which primarily considered the flow of vaccines through one particular part of the network, all three parts of the network are considered in the same chapter.

First, I consider what ANT has to offer an analysis of ethical issues.

Actor-Network Theory and Bioethics

In Chapter Two I revealed that, one of the three main criticisms of ANT is its ethical disengagement and that ANT's flat ontology and refusal to ascribe a prior or preferential status to any element of a network also extends to a reluctance to make ethical or moral judgements about the actants and their relations. However, I also argued that ANT's insistence that rigorous and impartial description must be the first obligation of the sociologist establishes a better informed basis for ethical or moral critiques or policy interventions, which derive from a quite different starting position. Furthermore, it has been argued that ethical questions benefit from the application of an STS approach which can 'further reveal some wider facets of bioethics as a way of thinking about new science and technology' (Hedgecoe 2010: 164) and specifically an ANT approach[112] (Callon, 1986; Law and Callon, 1992; Williams-Jones and Graham 2003):

> that explores the taken for granted nature of technology by tracing the social and technical relations involved in the development and implementation of technologies

[112] I also argue in this chapter that ANT benefits from the examination of ethical values as actants in networks, something which has on the whole been lacking in the approach.

> (Callon, 1986; Law and Callon, 1992). In particular, the heuristic methodology afforded by this ethical approach takes into account the social, moral and economic ambivalences of the multiple stakeholders (Singleton, 1996; Singleton & Michael, 1993) (Williams-Jones and Graham 2003: 271-2).

In particular, an 'after-ANT' approach (Law and Hassard, 1999), which is not marked by the same value-neutrality of early ANT in the 1980s, provides a fruitful way forward (William-Jones and Graham 2003).

The ANT approach asserts that morality is not limited to just humans but can also be applied to technology (Latour 1992, 1999, 2002), such as an influenza vaccine. For example, Latour (1992: 254) talks about the 'missing mass of morality': 'Morality is no more human than technology, in the sense that it would originate from an already constituted human who would be master of itself'. Before influenza vaccines were co-constructed, by human and non-human actants, there was no moral imperative for HCWs to be vaccinated because this option did not exist; and an example of moral obligation/principle embedded in technology are mandates for vaccination.

By applying an ANT approach it can be revealed that an influenza vaccine is a bio-technological actant, in a network, which has embedded in its scripts normative values and discourses of individual and professional responsibility for HCWs. For example, prioritising HCWs for influenza vaccination is in itself an ethical act around resource allocation and supports the idea that HCWs are susceptible to and/or spread influenza infection, and that they have a moral duty to accept influenza immunisation so that they do not act as a vector of influenza

to their patients or are unable to fulfil their work role due to illness caused by influenza infection.

Sociological approaches, including ANT, can help bioethicists to gain a broader and more contextual understanding of bioethical transactions and 'ethical moments' through its 'ethnographic approach to social interaction' and to understand the work done by 'professionalized' bioethics as actants themselves mobilised in a bioethical network (DeVries and Conrad 1998: 234). To this end, like the three previous empirical chapters, this chapter presents empirical data artefacts, in the form of transcript extracts, from interviews and focus group discussions with informants; this time to capture the ethical moments around influenza immunisation of HCWs.

The 'Ethical Moments' of Healthcare Worker Influenza Immunisation

Previous ANT research (for example, O'Cuinn 2013) has defined influenza as a disease which does not ethically require individuals to change their behaviour in order to prevent contraction and transmission of the disease. However, I would argue that this is not the case, with people increasingly being held morally accountable for the adoption of preventive health measures in the 'New Public Health' (NPH) under 'responsibilisation' (Crawford 1980) and 'healthism' (Gerlach 2004) discourses. Furthermore, Verweij (2005) argues that people have a duty to avoid infecting themselves and others, and that this duty extends to those who are unaware that they are infected but at increased risk of infection. The duty not to infect others follows on from the moral obligation not to harm others, also known as non-maleficence. Unlike, other diseases which have been categorised into either those 'whose prevention

demands individual behavioral change...[or] diseases that can be prevented by collective policy commitments' (Rosenberg 1989: 10), influenza, then, is subject to both.

Individuals are expected to take preventive health measures, such as engaging in good hand and respiratory hygiene etiquette[113], self-quarantine, eating healthily and accepting influenza immunisation; with the latter being particularly true for people defined as belonging to 'at-risk', or target, groups due to age[114], pre-existing medical condition or profession. Furthermore, influenza vaccinations are now available for over-the-counter (OTC) purchase at supermarkets, to be administered there by pharmacists, for adults who are not eligible for free vaccination because they have not been defined as being in a risk group and or a frontline HCW. As with all vaccines, no influenza vaccines are 100% effective[115], therefore, HCWs are asked to accept influenza vaccination in order to reduce, and not completely eliminate, the probability of becoming infected or infecting others with an influenza virus on a population, rather than individual, level.

However, in Chapter Six, I revealed that several informants, because they participated in hand hygiene and respiratory etiquette, had proposed that influenza vaccination was not necessary. It has been suggested that:

[113] For example, the DH campaign 'Catch it. Bin it. Kill it' declares that people should 'Always carry tissues and use them to catch your cough or sneeze...Dispose of your tissues as soon as possible...Clean your hands as soon as you can' (DH 2007b).

[114] Children, who were not already enrolled through belonging to an at-risk group due to a medical condition, have most recently been enrolled in the network.

[115] This percentage can vary considerably from season to season depending on the match between the vaccine and wild influenza strain circulating.

> [this] tendency to privilege issues of cleanliness and public hygiene over germ theories (Small 1998) highlights the profoundly moral and political dimensions to discourses over diseases and pathogens, which are still with us today… This in turn meshes with Mary Douglas's (1966: 31) concern with dirt as 'matter out of place,' which suggests that in order for dirt to be defined, a moralized framework as to where particular kinds of matter belong is presupposed. It can therefore be proposed that the pathogenic agents, and those whose job it is to combat them, have a kind of 'moral career' in the manner identified by Becker (1963) or Goffman (1961) (Crawford et al 2008: 332).

In this study, then, influenza viruses have a 'moral career' as infectious agents, and human and hybrid actants (i.e. vaccines) have a 'moral career' in the potential to work together to prevent or control the success of this infectious agent.

The vaccination status of HCWs can be viewed as 'collective capital owned by the' (Herzlich and Pierret 1987: 161) healthcare organisation (for example, LHB) because: 'In the context of Western economies, in which expanding production and the accumulation of wealth are important, 'good health' is that condition which is least disruptive of production: the 'healthy citizen' is the citizen who can work continuously over her or his lifetime' (Petersen and Lupton 1996: 67). It can be argued that the maintenance of the good health of HCWs not only benefits healthcare organisations due to reduced absenteeism and associated costs, but also benefits patients by reducing their risk of HAIs and ensuring that they have sufficient experienced HCWs to look after them. It also benefits other HCWs, who do not have to provide cover for ill colleagues and who are less likely to catch infections themselves. In this

way influenza vaccines can be seen as 'healthy' commodities (Petersen and Lupton 1996). Indeed, some informants reported that they accepted influenza immunisation so that they did not let colleagues down by not being available to work. However, a KI at LHB A reported that their staff believed that the LHB wanted HCWs to be vaccinated to reduce staff absenteeism and associated costs, and that this belief actually did work in the network to obstruct the flow of vaccines. While a midwife at LHB A testified that there is also a duty of care for HCWs to themselves by not putting themselves at risk of side effects of influenza vaccinations: *'And at the end of the day you've got a duty of care to yourself as well'.* Although, others testified that they work when ill, including from ILIs, also so that they do not let colleagues down; whereas others, including a midwife, proposed that the duty was only to not bring symptomatic infections into the workplace: '*I think the duty of care is not going into work when you're ill'.* However, this statement does not take into account that most of the spread of influenza is done in the pre-symptomatic stage of the illness. So these moral imperatives can work to both prevent and facilitate the spread of infectious diseases, including influenza. Van Delden et al. (2006: 5564) agree that 'a hard-working ethos might increase the risk of infecting a patient'.

In Western countries neglecting to 'conform to the imperatives of 'expert' public health knowledges' (Petersen and Lupton 1996: 61), engage in health-protective behaviours, and take up preventive health measures like vaccination, is seen as a moral failing (Herzlich and Pierret 1987; Saltonstall 1993; MacInnes and Milburn 1994; Lupton 1996). This is not only because of its impact on production but also because individuals are seen as not only being personally responsible for their own health but also for the health of others in society,

particularly where contagious diseases, such as influenza, are concerned: 'Good health, therefore, is related to virtuous citizenship because of the benefits that extend from the individual to the social body' (Petersen and Lupton 1996: 67). This is doubly so for HCWs who are, in addition, seen as being individually responsible for HCAIs, with the social, cultural and structural reasons for HCAIs/HAIs being largely ignored. Pellegrino and Thomasma (1988) propose that health professionals have trust and esteem from society because they put patients' interests before their own. Furthermore, Clark (2002) proposes that there is an implicit social contract of the duty of care between health professionals, particularly doctors (Reid 2005), and society. Kotalik (2006) concluded that a moral obligation exists for healthcare professionals to accept vaccination. Wicker and Rabenau (2010: 104) propose that:

> the obligation to do no harm is not coercion; it ought to be a fundamental ethical principle for HCWs (Rea and Upshur 2002). The "autonomy argument" focuses on individual rights of HCWs to refuse immunisations, ignoring the rights of patients. Ethical assessment requires the party responsible to balance competing rights, and should include a patient's rights to a safe healthcare environment (Lambert 2008).

In the UK healthcare network, moral scripts are embedded in the 'Green Book' which outlines the duty of care for HCWs to accept occupational immunisation:

> Any vaccine-preventable disease that is transmissible from person to person poses a risk to both healthcare professionals and their patients. Healthcare workers have a duty of care towards their patients which includes taking reasonable precautions to protect them from communicable diseases. Immunisation of healthcare and

> laboratory workers may therefore: protect the individual and their family from an occupationally-acquired infection; protect patients and service users, including vulnerable patients who may not respond well to their own immunisation; protect other healthcare and laboratory staff; allow for the efficient running of services without disruption (Salisbury, Ramsay and Noakes 2006: 84).

However, some informants claimed that they were unaware or unsure of this duty, including an ED nurse: '*I can't have thought it was a duty...because I would have had it [influenza vaccination] myself you know'.* In opposition to the view that HCW influenza immunisation is 'in potentia' mandatory already, because the duty of care to accept vaccination is embedded in the 'Green Book', a midwife proposed that HCW influenza immunisation would already be 'in actu' mandatory if there was a duty of care for HCWs to accept preventive health measures, such as vaccination: *'No because if it was duty of care we'd all have to have it [influenza immunisation]'.* Whereas, others, including a midwife, reported that they believed it was a duty of care; but that this did not mobilise them as vaccinees:

> *yes it is a duty of care but you know what I mean, there's grey areas in everything. And um you know we have got a duty of care to the [pregnant] women and I understand what you're saying, but it comes down to the same thing all the time, I'm carrying around bugs with me, lots of different bugs, I don't know what I'm carrying around with me, unless we're going to be screened on a regular basis, say right this week we're testing for this that and the other. Unless we're gonna screen us on a weekly basis to say sort of "right are you fit to practice this week or not?", you know what I mean? Until you've got that programme in um, place um, I'm not gonna be vaccinated.*

It is noteworthy that only doctors, and not nurses nor midwives, have this duty embedded in their code of conduct (GMC 2006). Nevertheless, an OH professional contended that all HCW vaccination is in fact 'in potentia' mandatory already, because they wrongly assumed that this duty is present in the network:

> *It shouldn't happen because there is a professional responsibility quoted by both the General Medical Council and the Nursing and Midwifery Council in their codes of best practice. If as a health care professional you are aware that you have an illness or a condition that could affect a patient, you should declare it. Or if you are aware of measures that you should take to help protect patients then you should do it... so the responsibility is already on the health care professional to do it but they're obviously not doing it.*

Moreover, where these codes of practice and legislation[116] are present, 'in actu' these are not put to work in the network. Is this because of the cost of vaccines and administering the immunisation programme to the NHS? Is it because the NHS is paying 'lip service' to WHO and ECDC recommendations to vaccinate HCWs against influenza? Is it because implementing a mandatory programme would be unworkable if too many HCWs refused vaccination, given that HCWs are a relatively scarce resource in the UK? Or are all of these factors at work in the network?

The role of HCWs in promoting influenza immunisation to patients and to other HCWs when those HCWs themselves are unwilling to accept influenza vaccination[117] is also an ethical

[116] I considered the legal basis for this immunisation programme in Chapter Four.
[117] This issue is also examined in Chapter Five.

moment, as a paediatrician and senior midwife proposed, respectively; but this still did not mobilise the senior midwife as a vaccinee herself:

> *Also the whole advocacy, if you can't get, if you're saying to patients to get the flu vaccine but aren't prepared to take that risk yourself, it's an inconsistency that's there. The other thing is, we're recommending that they [other staff] have it as well. So part of me did think when I was recommending it to people that they have it, well there's a cheek because you haven't had it, so. And if I got it and they caught it off me it would be a bit horrendous...I think that health professionals are the world's worst though aren't we? Do you know what I mean? We give out the message but we don't practice it...because we think we're marvellous and immune to it all. We tell you it's good to do this but we're still overweight ourselves, we don't have this, we drink too much.*

Furthermore, the role of senior HCWs in promoting influenza immunisation for their staff also raises the ethical question of whether their mobilisation as vaccination champions should be compulsory, as KIs highlighted: *'What we also need to do is out in some of our other areas is get the most senior people in those areas done as well so that again it's a leadership issue, and make it more about leadership not just about personal choice'.* This compulsory approach was reported to be necessary because voluntary mobilisation was not working: '*You know the negative for me is, is the attitude of some of the ward managers and senior staff around this. I could have done with a bit more help there'.* This is a particular ethical issue (for senior HCWs who promote influenza immunisation to their staff) when they have not been mobilised as vaccinees themselves. However, a KI at LHB B reported that they did not consider this to be an issue: '*So you know if it's my view I would never have a vaccination, that's not to my right to impart that knowledge on somebody else, it's to actually give you the information and to say that well the facts are...What I would choose to do is my choice'.*

Furthermore, whether vaccinators and champions should put pressure on other HCWs into accepting influenza immunisation is an ethical issue. An ED doctor testified that a vaccination champion put pressure on HCWs to accept the pandemic vaccine:

> *she basically went round rounding everybody up, dragging them down to get their flu jabs. Not, they weren't strong armed into it, they just had to argue why they didn't want the flu jab with a very determined nurse...she's hard to say no to... most staff, most of the senior staff, all of the consultants, all our juniors then felt pressured to do it... So there was a bit of peer pressure.*

In addition, some informants, including an ED nurse, reported that they felt pressure from OH staff to accept the influenza vaccination: '*You were bullied into going to have it done'.* Similarly, a paediatric nurse reported similar concerns about being pressured by OH professionals to sign a form that they had refused influenza vaccination:

> *"why d'you want me to sign something to say I refused it?", because then you know if for the first time in twenty years I have a day off sick, feeling a bit fluey, they go "that's 'cos you wouldn't have the jab". Well it wouldn't, unless they actually found out which strain it was that I was off sick with, whether it was the one that could be partly vaccinated against or one of the ones that's not included, so. And I'm thinking "don't bring that one back on me", you know. Um Occupational Health departments are like that.*

The informant suggested that the OH professionals wanted a declination statement signed because OH departments are themselves under pressure from PHW or the LHB to reach immunisation targets:

> *obviously they've got targets as well, Occupational Health, either Public Health or imposed by the Trust...it seemed to be more that that they were concerned about as well that I wasn't and it just needed to be noted down somewhere. Does it need to be noted down somewhere?... "You've offered it and I said no, end of story, ask me next year".*

An OH professional admitted that some HCWs felt they were being pressured by OH professionals into accepting the vaccination in the 2011-12 winter season '*I think it was only as we got towards the end of this year's programme and we kept pitching up at a place and saying "is there anybody that's still not had it?" and some people said "oh not you again", you know. And they felt that we were nagging and harassing*'. In Chapter Five, OH informants reported that they used 'bullying' and 'emotional blackmail' in order to enrol HCWs as vaccinees. The question was posed: At what point does the encouragement of consumers to be recipients spill into coercion, with the risk of disrupting the network's ontology? This also raises the ethical issue that if a mandatory programme has not been inserted into the UK network then should HCWs be under any pressure or sanctions if they do not accept vaccination.

The 'Ethical Moments' of Influenza Pandemics

Thus far, in this chapter, I have considered the general ethical issues (i.e. seasonal and pandemic HCW influenza immunisation) that affect the network. In addition, there are concerns that are only present in the network during an influenza pandemic.

In his 2013 Richard Dimbleby Lecture, Bill Gates asserted that: 'The purpose of Public Health is to promote social justice' (Gates 2013), and, social justice has been defined such that: 'each person in society ought to receive his [or her] due and that the burdens and benefits of society should be fairly and equitably distributed' (Beauchamp 1976: 3). However, despite the fact that 'Epidemics have always provided occasion for retrospective moral judgment' (Rosenberg 1989: 9), examining the ethical issues around PH, including pandemic influenza planning (Kotalik 2005; Zoloth and Zoloth 2006), is relatively recent (Beauchamp and Steinbiock 1999; Callahan and Jennings 2002). Furthermore, it was only in 2007 that the UK DH inserted its first pandemic influenza ethical framework into the UK network[118]. The framework was re-assembled and re-inserted into the UK network in 2011, in light of the work done by the A(H1N1) influenza virus during the 2009-10 pandemic. This insertion of an ethical framework for pandemic planning into the UK network marks a shift from retrospective to pro-active moral judgement.

Infectious diseases, and in particular, epidemics and pandemics, raise important bioethical dilemmas about individual autonomy and population safety, as the 2007 framework and WHO acknowledge, respectively:

> Planning for a pandemic, and responding to one while it is happening, involves many difficult decisions. These may create tension between the needs of individuals and the needs of the population. Such decisions can be personal – How should I behave? – or

[118] This framework was developed by the Committee on the Ethical Aspects of Pandemic Influenza (CEAPI) which was set up on the recommendation of the CMO for England in 2005.

> wider, for example, affecting the organisation and delivery of health or social care Services[119] (DH 2007a: 5).
>
> ethical issues are part of the normative framework that is needed to assess the cultural acceptability of measures such as quarantine or selective vaccination of predefined risk groups". A common theme in pandemic planning literature is the need for decision making around limited resources and the treatment of essential health personnel who assume great personal risk in the conduct of their duties (WHO 2005).

However, as has been illuminated in Chapters Four, Five and Six, pandemic planning is limited to the extent that pandemics diseases conform to planners' expectations. As Rosenberg (1989: 9) highlighted: 'We have not, it seems, freed ourselves from the constraints and indeterminacy of living in a web [or network] of biological relationships - not all of which we can control or predict'.

In pandemic situations HCWs are expected as good professionals to risk their own health, and by extension that of their family and friends, by caring for infectious patients. Some see the duty to treat as a professional obligation and this duty is in fact laid out in the various health professions' codes of conduct; unlike the duty of care to accept influenza vaccination which, as has already been noted, is only present in doctors' code of conduct, and not in other HCWs'. HCWs may also be asked in pandemic situations to work additional hours and undertake work that they are unaccustomed to doing. Wynia (2003) found that the majority of HCWs in the study would be unwilling to treat patients with smallpox and studies from the

[119] 'Responding to pandemic influenza: The ethical framework for policy and planning' http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_080729.pdf accessed 23/9/12.

2003 SARS epidemic (Bevan and Upshur 2003; Timson 2003) reported that some hospital workers were reluctant or refused to work with infected patients. The duty of HCWs to care for and treat patients (Godderis and Rossiter 2011), and accept pandemic influenza vaccination (Wynia 2003), during a pandemic have been identified as ethical issues in pandemic preparedness. An OH professional reported that this was an issue during the 2009-10 pandemic:

> *In fact there were some situations where staff were getting to the point of saying "Well if I have a health condition, I shouldn't be looking after that person. I may be being compromised because I'm on treatment for another medical condition. Therefore if I did catch the infection off a person who, I'm more concerned of what the kids would have", because there was a concern that the mortality was particularly so among sort of youngsters and teens... in fact there were grave concerns, some staff were saying "oh I may not want to look after that person"...there were plans being considered, well if people are not going to do it are they sent home, are they suspended, do you relocate them to another ward?... Well you know what happens if my staff say I'm not going to look after the patient in bed 3 because they've got swine flu. I need all this kit on, it's got to be dangerous because you wouldn't be giving me otherwise...You know the message is coming out you mustn't go out of the house or you mustn't spread it to other people. Umm yet that highly infectious person is coming through the door into the hospital and I'm looking after you.*

Gordon (2005) suggests that doctors may not have considered risks to their own health when deciding to enter the medical profession. Moreover, Singer et al. (2003) argue that HCWs'

professional duties have limits, while acknowledging that the nature of these limits is contested. Verweij (2005) concluded that utilitarian theory, as opposed to social contract theory, 'is better able to set the limit on precautions against infection' (Kotalik 2005: 61).

A Gendered Duty of Care

Godderis and Rossiter (2011: 1) have argued: 'that increased risk during a pandemic is an issue that is at once moral and gendered, and thus uniquely social'. They examined the 1918-19 influenza pandemic in Canada and concluded that the gendered nature of the duty of care (and the duty to treat) in the pandemic is relevant to healthcare today. Given the gendered nature of HCW composition in the UK, I would argue that this study is also pertinent to the UK healthcare system. The majority of nurses (who are the largest professional group in the NHS) and midwives, are women; and, a two year review[120] by the Royal College of Physicians in 2009 reported that 40% of doctors are women and proposed that 'sometime after 2017' the majority of doctors will be female. As a result, most frontline HCWs are women (Adams 2010) and it is these frontline HCWs who face the greatest risks during a pandemic (Ruderman et al. 2006). Godderis and Rossiter (2011:5) argue that pandemic planners should take this gender dimension into account because: 'The duty to care remains a critical issue in contemporary pandemic planning and response'. I would argue that this gender dimension is also relevant to UK HCW influenza immunisation programmes, with female OH professionals carrying out the majority of the administration of the programme and female HCWs being the main recipients of influenza vaccinations.

[120] http://www.rcplondon.ac.uk/sites/default/files/documents/women-and-medicine-summary.pdf [accessed 5/4/2013].

Some women seem to be mobilised by this responsibilisation for their family's health to accept influenza vaccination. For example, an OH professional highlighted that female HCWs were more concerned about transmitting influenza to their children than male HCWs were:

> *I don't think for the majority of people that I'm protecting my patients is going to be important for them. The one thing which goes back to what seemed to be a trigger in pushing up some of the swine flu vaccinations was the concern that patients were coming in with the illness and mums more so rather than dads, and mums would be going home, they will be a vector of transmission of the virus infection to their kids. That seemed to be far more important than anything that we said.*

In addition, with the majority of the NHS workforce being comprised of (female) working class nurses, there could also be a social class element to this duty of care. Are working class nurses being pathologised as contagious (Durbach, 2000: 49)? If so, 'vaccine resistance…[is] also about resisting negative class identities and the regulation of the working class body' (Hobson West 2005: 80).

Compelling Healthcare Workers to Enrol in the Network

I have already considered some aspects of coercion in the network; for example, pressure from other HCWs and unofficial mandates. In addition, where the duty of care and the duty not to harm have failed to mobilise HCWs as influenza vaccinees, in some countries healthcare organisations have inserted mandatory vaccination programmes into their networks. Mandatory vaccination of HCWs has also been described in bioethical terms as 'a controversial strategy that pits health care worker autonomy against patient safety (Van

Delden et al. 2008; Talbot 2008; Tilburt et al. 2008; Helms and Polgreen 2008; Isaacs and Leask 2008; Poland, Tosh and Jacobson 2005)' (Babcock et al. 2010: 460).

Mah (2008) proposed that both proponents and opponents of mandatory vaccination employ securitization discourses. Proponents consider public security by highlighting subclinical infections, the duty of care and increased efficiency/productivity due to reduced worker absenteeism. Opponents focussed on personal security, liberty and individual rights by emphasizing the risk of adverse events from vaccinations. Mah (2008: 192) concluded that 'stakeholders talk past each other'.

Studies by Poland, Tosh and Jacobson (2005), Palmore et al. (2009) and Carlson et al. (2010) argue that mandatory vaccination of HCWs is required in order to reach sufficient levels of vaccination. However, other studies (Verweij and Dawson 2004; van Delden et al. 2008) propose that conditional vaccination is only acceptable, under the principle of subsidiarity, when voluntary programmes have failed and serious harm is a real possibility. Kotalik (2006) favours mandatory vaccination in severe pandemics, where a voluntary vaccination programme would be unable to attain high uptake. Sullivan (2009) recommended rejecting mandatory individual vaccination and instead supported institutional mandates that protect individuals' rights to decline vaccination for philosophical, religious or medical reasons.

In countries, such as the US and Canada, where in some hospitals influenza immunisation of HCWs is mandatory, and therefore 'in potentia' all HCWs are enrolled into the network as

vaccinees, nevertheless 'in actu' some actant have not been mobilised by mandatory vaccination policies. This is due to the presence in the network of hybrid actants of legal exemptions for religious, medical or philosophical reasons. Such objections and exemptions it can be argued are protected by UN Siracusa principles[121] but they also raise their own ethical issues given the 'herd immunity' effect that vaccination can confer (Smith et al. 2004)[122]. An OH informant, while recognising that mandatory programmes had been successfully enrolled into another country's networks, proposed that the presence of such exemptions in a UK network could complexify the vaccination programme and that medical exemptions would bring their own ethical dilemmas of iatrogenic disease and medical confidentiality for affected HCWs:

> *It would be a lot simpler in some ways if it was mandatory but then it would also be more complicated because who would be exempt if you like and whether that would be reasonable…The problem with mandatory vaccination is that you're likely to have a separate population of individuals who whatever health reason, maybe immunosuppressed, maybe chemotherapy where they won't be vaccinated. HIV classically falls into it. That could lead people to become a little suspicious, "why's he not vaccinated?".*

Another OH informant argued that inserting mandatory vaccination exemptions into the network would complexify the administration of the immunisation programme:

[121] United Nations, Economic and Social Council, U.N. Sub-Commission on Prevention of Discrimination and Protection of Minorities. Siracusa principles on the limitation and derogation of provisions in the International Covenant on Civil and Political Rights, Annex, 1984. UN Doc E/CN.4/1984/4.
[122] Chapter One outlines the difficulty in establishing a level for herd immunity with influenza immunisation.

> *I just think you'd just have an increase in conversions [laughs]. Religious fervour...people would find another way. So if somebody told you, you had an egg allergy, or they'd had anaphylaxis to a previous vaccine or if there was a product in it or they were allergic to latex, the bung or the sheath, had some sort of latex, it could. And they'll find a way not to have it, so.*

This informant's statement is in opposition to van Delden et al. (2008) who estimated that the level of 'conscientious objections' would be low under a mandatory programme. Furthermore, Babcock et al. (2010: 459) found that: 'Fewer employees sought medical or religious exemptions than had signed declination statements during the previous year' and Wicker and Rabenau (2010: 101) reported that 70% of HCWs working in a German hospital said they 'would accept mandatory influenza vaccination'.

Salmon et al. (2003) reviewed vaccination legislation in the UK, Australia and the USA and concluded that mandatory vaccination may be effective both in disease prevention, immunisation uptake and speed up novel vaccine insertion; but to be effective mandatory programmes must have dependable supplies of safe, effective vaccines and the majority of the population must be willing to accept vaccination without the need to employ coercion. As I first considered in Chapter Five, some informants, this time a KI, questioned the effectiveness of influenza vaccines: '*And what's the basis for it. Both, you know, in terms of how effective the vaccine is, which most are very effective and some aren't. And also what's the real risk. You know, what is the real risk of healthcare workers transmitting an infection?'.*

Salmon et al. (2003) also found that vaccination exemptions could be useful in limiting a hostile reception from the public. Applying this study to the case of UK HCW influenza immunisation leads me to the conclusion that a mandatory programme may not work in the UK, unless UK governments and/or Trusts/CCGs/LHBs are willing to invest in much greater supplies of influenza vaccines than they currently do. Furthermore, the majority of the HCW population does not accept influenza immunisation (without coercion) at present; whereas some at-risk groups do (i.e. those over 65 years of age).

Van Delden et al. (2006) suggests that the term conditional vaccination is more apt than mandatory vaccination because HCWs will not actually be physically forced against their will to have a vaccine inserted into them but will face other sanctions, such as being required to wear a face mask, take on different work duties or be excluded from work temporarily or permanently; others have used the term compulsory and required instead. Similarly, a vaccination champion proposed that a vaccine mandate would not work as a passport to cross the HCW's dermal (or nasal) boundary:

> *And how can you inject somebody that's not going to give you their arm to do it. You know if they can avoid coming in, they can say "well no I'm not coming in". You're not going to get them arrested to the door are you? D'you see what I'm saying? I don't think it could practically work.*

Furthermore, Van Delden et al. (2006: 5564) propose that temporary exclusion is 'difficult to implement and ineffective' because of pre- and a-symptomatic influenza infections.

Rudner (2007) proposed that mandatory vaccination programmes lead to high opportunity costs in terms of tracking down HCWs who have failed to be vaccinated; several participants, including a midwife also highlighted this issue: '*You can say it's mandatory, but what do you do when some people say no? I think it would be really hard to police that. Where would that end, you know?'.* As reported in Chapter Five, a vaccination champion claimed that OH vaccinators struggle to keep track of who has and who has not been vaccinated. Therefore, if a mandatory programme was inserted into the UK network, vaccination champions may become obligatory passage points in a mandatory network, due to their increased ability to document their colleagues' vaccination status.

Several informants, including KIs, also suggested that inserting a mandatory programme into the UK healthcare network would still require considerable work to be done by LHB actants in order to mobilise HCWs as vaccinees: '*they're going to have a bit of a tussle on their hands trying to make it mandatory';* particularly, where the scientific evidence is not strong enough to support the insertion of the mandate, as a KI at LHB A proposed:

> *you're probably going to spend so much time arguing about it it's not going to work. Or you then say how do I manage the people who won't comply? So this is the danger sometimes when you get into the mandatory situation, if the evidence is strong there's no problem, if the evidence isn't strong um you've got be prepared to say well what if 20% of people don't comply. You know does that mean that I'm going to stop them working?*

Other informants proposed that mandates need to be supported by sanctions for non-compliance if they are to be effective at mobilising HCWs as vaccinees: '*People are, unless they want to do it for positive reasons, they are sometimes a bit more resistant, unless there is another strong sanction used'.* While sanctions may mobilise some HCWs, others may still refuse vaccination and the ultimate sanctions of dismissing the HCW or refusing to provide staff with sick pay may be difficult to enforce, as an informant recognised*: 'Because how can you say somebody can't work anymore if they won't have their seasonal flu... If you get it [influenza] they won't pay sick pay'.* In fact, very few healthcare organisations, in countries with mandates, have ever dismissed staff due to non-compliance and such sanctions are controversial, as another informant highlighted: '*if you beat them the other way you're going down the route then of what d'you do if they don't have it...You can't say dismissal, um because you're in the tribunals. Somebody will fight that'.*

Special arrangements for vaccines to travel would also have to be provided, for HCWs whose bodies do not conform to the usual vaccine configuration, as an informant recognised: '*what do you do for the people who won't be vaccinated, what do you do for those people who can't have it because they've got an allergy, true allergy? Do you say you can't work for us? I think it opens too many questions. There's too many, a can of worms really'.* An OH informant suggested that medical exemptions for influenza vaccination would result in more complications than for HBV vaccination:

> *what do you say if I couldn't. It's like people think what do you do with a doctor who can't have Hepatitis B? It's fine. You just can't, he just has to have his bloods checked and if he's a surgeon he has to have his blood checked every year to make sure he's*

> *not a carrier. And that's just part of the deal. You can't do that with flu. So uh what would you do for those who couldn't, what would you do for those who have a serious reaction and sue you?*

Moreover, some informants, including a midwife at LHB A, went further to suggest that inserting a mandatory programme would in fact lead to lower uptake with previous vaccinees unenrolling themselves from the network: '*I'd be so incensed that somebody had tried to force me into doing something. In fact I think it would backfire. Less people would uptake, they'd be angry I think'.* Furthermore, an ED doctor and a vaccination champion, respectively, proposed that a mandatory programme could have a negative effect on staff morale: '*if somebody's made to do something there's sometimes a bit of apprehension and a bit of resentment for that isn't there? You know people don't like to be told to do anything do they?';* even when they recognise that there is a duty of care: '*I think the way they think of it is that you know "that I won't be told I must". That you know, "I am my own person and yes I work for the Trust, I have a duty of care to the patient but I also um have a conscience for myself and making my own decisions"'.* However, another midwife did not agree with these assertions: '*I think if we were made, not that you can make people do it, but if they said right you've got have it'.* Therefore, the duty of care around hospital acquired viruses is a complex issue; as a KI at LHB A seemed to recognise:

> *It should be compulsory and if I look at the nursing workforce, I mean their priority is that they have a duty of care to their patients. And, but then you, we do have hospital acquired infection; so we have C Difficile, we have, I mean it's different with the viruses, with norovirus it's very difficult because it's quite difficult to contain but you know our*

> *registered nurses have a duty to wash their hands, to be knowledgeable about their competencies and skills and about barrier nursing and wearing protective equipment, etcetera. And they have a duty of care to ensure that they're not passing on infection to patients. So flu is similar but it's a tricky one isn't it around that, because it's about their roles and responsibilities. You could say it's a virus and they come into work and they care for their patients but I do feel it should be mandatory.*

In addition, a vaccination champion proposed that mandatory vaccination is not acceptable in the UK because we value individual informed choice, consent, autonomy and rights over collective rights: '*But the way the UK is, because we do, we sort of put into human rights and peoples' choice and you know um it's the same with anything you do [in healthcare], you can't do anything without consent, you know written consent or verbal consent'.* A midwife also proposed that culturally, mandatory vaccination would not be acceptable in the UK: '*We don't tend to do that sort of thing in this country'.* An OH professional went further to suggest that UK HCWs may be less 'responsible' than US HCWs because they are more likely to refuse occupational vaccination:

> *there are lots of other examples where I think health care staff certainly in the UK, are not as responsible as they would be in the States, because why is it that we still get a poor uptake and almost an argument between some staff "No I'm not having the mumps, measles and German measles vaccination. I don't want it. I don't need it''.*

However, a midwife testified that UK HCWs are subject to some mandatory procedures as part of their professional role: *'But we do, as an employee in the NHS, you know when you*

come into post you know you are screened and you know you do have to receive certain and make sure you're covered, aren't you, for certain vaccinations, etcetera'. Furthermore, an OH informant highlighted that other public service workers have mandatory health requirements as part of their professional obligations and proposed that HCWs should be no different:

> *If you work in a different type of work like a fire fighter you're supposed to have a certain level of physical fitness and eyesight is up to a certain standard, to ensure you can do that job safely and properly. You can do that for health care. I don't have a problem with it; I think it has to be managed sensitively.*

This analogy has also been made by Singer et al. (2003).

The same OH informant proposed that a mandatory[123] policy may mobilise HCWs' as vaccinees: '*Clearly the voluntary approach is not working and if you made it mandatory it may make people realise that they do have a responsibility to other people other than themselves'.* A mandatory programme may also allow HCWs, who have espoused strident and entrenched anti influenza vaccination views in the past and who have contended that they are not at risk of infecting their patients with influenza, to receive influenza vaccination without having to admit that they were in fact putting their patients at risk. HCWs would then be able to maintain their professional identity of a caring health professional, and not have to lose face in front of their colleagues.

[123] Mandatory immunisation is also considered later in this chapter.

While, a paediatric doctor proposed that a mandatory programme would only be acceptable in the Welsh network (and by extension the UK) if human actants in PHW, inserted an immutable mobile, influenza vaccine adverse event risk statistics, into the network. The doctor asserted that these statistics were in turn dependent on another non-human actant, the risk of negative consequences from wild influenza virus:

> *I don't think there should be a choice, just make sure that the Public Health people get the stats right so there is no risk or the risk to the public is remote, very remote. The risk of wild disease is multitudes greater than the risk of vaccination and then you can always make the argument; orders of magnitude greater than the risk, the wild disease orders of magnitude riskier than the vaccine.*

A Scottish Executive report concurred with this statement: 'Compulsory vaccination increases the burden on governments to ensure vaccine safety' (Salmon et al. 2003: 440).

An ED doctor proposed that a mandatory programme would not be acceptable in the UK for influenza but that it is for another infectious disease, hepatitis B:

> *It's not like you know you can do something like hep B for people that are doing exposure prone procedures but you can't you know, you couldn't use that same excuse for flu really could you?...I think the medical staff here have hep B. You have to do that. But with something like flu I don't know.*

Willis and Wortley (2007: 20) proposed that HBV vaccination 'primarily benefits the HCWs', whereas influenza vaccines primarily benefits patients, at least in the case of young, healthy HCWs and that 'This perspective may lead to differing motivation to be vaccinated on the part

of the HCW'; an OH professional stated that they agreed with this proposal: '*Hepatitis B is a little easier; people can see some benefit to them...and I suppose the thing with hepatitis is that they can see in their own minds that yeah this is a more significant problem and at least the vaccination could actually help me'.* However, pregnant HCWs, and all young HCWs in influenza pandemics are at risk of serious infection. Chapter Six revealed that informants reported that this was not the case was shaken by H1N1 pandemic; but HCWS need to keep this in their knowledge assemblage and attach this to post-pandemic seasonal vaccination in order to stabilise the programme. In addition, a different OH professional put forward the opposite view, that compulsory influenza immunisation for HCWs is acceptable while it is not for other infectious diseases, because of the ease with which the influenza virus can be inserted into human actants: '*you possibly you could about flu...because just by the way that it's spread isn't it. Um it's much more difficult to pass on TB and hepatitis B and all of the others. But none of those are mandatory, so'.*

An ED nurse and midwife (who reported that she is strongly against influenza immunisation but accepted repeated HBV vaccination), respectively, testified that HBV vaccination it is 'in potentia' mandatory for HCWs, as you are effectively barred from entering the healthcare profession if you have not had the vaccination:

> *Yeah we have that [HBV vaccination] when we started you know...I think we were just told at the end of the training you know.*

my Hep B, I had that but that was in my younger days when I had to have it. You know I was desperate to get into the caring profession and I thought that that was going to prevent me.

While, a midwife proposed that conforming to social norms led her and other HCWs to have the HBV vaccine: '*I think we were just like sheep and we went'.*

Mandatory influenza immunisation is unlike other immunisation programmes in that, as a previous study contended, 'compulsory annual influenza vaccination requires repeated impositions on the individual' [124] (Mah 2008: 193). These 'impositions' or 'burdens' of vaccination have been described as: 'Burden to individuals is expressed as common, local and systemic side effects of vaccination, as well as the time it takes to have the procedure done' (Kotalik 2005: 31). A paediatric nurse proposed that mandatory annual influenza immunisation for HCWs would be undeliverable without the mobilisation of vaccination champions: ''*cos it's yearly I just don't know how they could do it. But like I say if we had a vaccination champion who, we've got about 32 staff, nursing staff, so if you had somebody who went and took that role, possibly yes'.*

Another OH professional and KI, respectively, proposed that it would only be ethical to impose mandatory vaccination on HCWs joining the LHB and not those already employed by it as this would be changing the terms of their employment:

[124] The repeated nature of influenza immunisation is also considered in Chapter Six.

I think you would have to say if you apply, I don't think you can change the rules on someone. You know it's like pensions everybody's up in arms about it. Don't change the rules half way through but if you apply for this, for a job as a staff nurse on this ward and part of that is I signed up to I will do my basic life support every year, I will have my seasonal flu every year, I will prove to you I'm not a carrier of Hepatitis B, I will not cause harm to my patients. So that's what you sign up to and it's people choices whether they take that job. I think imposing mandatory stuff on people who are already employed is a legal nightmare and I think it will only take one person to have a reaction to a mandatory drug for it to be sued and stopped and I don't think they'll ever go there because if you can imagine that you said you have to do it... I'm always a great believer in eyes wide open. So as long as people are informed then they would make a choice...You know there's possibly an argument for herd immunity, better herd immunity if we gave it but I think it's a legal, a legal, legal nightmare...Is it a step too far? Possibly.

I think that new people coming into the organisation absolutely because they understand that that's an important element of what they need to do... any new starters I think you could almost impose that... people coming into the organisation now are very clear about that that's the rules and regulations of the organisation.

However, this would set up a two tier system of mandatory vaccination which could also be difficult to mobilise and may cause friction between HCWs, some of whom are subject to mandatory vaccination and others who are free to make their own choice whether to accept influenza vaccination.

Mandatory vaccination has not been legal in the UK for decades and HCW vaccination has never been compulsory here. In 2004, the BMA considered and rejected re-inserting compulsory vaccination into the UK network. The BMA supported a 2003 Scottish Executive Report which had declared that:

> such a policy [compulsory vaccination] is not consistent with key elements of the frameworks or principles for immunisation policy. On a practical level, it is not self evident that it would lead to higher levels of immunisation. More substantively, it runs counter to the . . . core principle that vaccines should be administered on a voluntary basis (Salmon et al. 2003: 438).

The same report also concluded that compulsory vaccination exemptions enable large numbers of HCWs to evade enrolment into the vaccination network: 'High rates of exemptions render compulsory vaccination ineffective. Additionally, exemptions raise problems with social equity:...[people] who claim exemptions will benefit from herd immunity, but avoid the risks, however small, associated with vaccination' (Salmon et al. 2003: 440). Nevertheless, the report also suggested that there was scope for successfully inserting non-medical exemptions into a compulsory vaccination programme, by re-assembling a previous UK hybrid actant:

> The US approach to conscientious objectors to military conscription could be used as a model for implementation of non-medical exemptions to vaccinations. The military conscientious objectors model was based on the British model for immunisation exemptions and was recently used to revise exemption legislation in the state of Arkansas. Application of the military model to immunisation exemptions would ensure

> exemptions granted on the basis of strength of conviction rather than the nature of the belief (religious versus philosophical) (Salmon et al. 2003: 440).

While acknowledging the advantages of local flexibility in mobilising mandatory legislation, the report also highlights the risk to certain parts of the network being infected with influenza viruses:

> Allowance of local implementation and enforcement of vaccine laws and requirements recognises that beliefs and cultures can vary between settings.
>
> Nevertheless, if these local variations are allowed and laws are not applied equally across populations, there could be clustering of unvaccinated people, which could increase the risk of disease in individuals and in the community, and may also raise social equity issues. (Salmon et al. 2003: 440).

This issue is important in the context of the UK NHS, as HCW composition varies considerably between different areas of the UK. The UK NHS relies heavily on HCWs from around the world and from diverse ethnic, cultural, religious and philosophical backgrounds. However, urban areas and larger hospitals are more likely to have a greater diversity of HCWs. Vaccination exemptions in a mandatory programme in the UK may then result in some hospitals and/or areas being more susceptible to influenza infection than others. Previous research has found that disease outbreaks can occur in unvaccinated clusters (Gangarosa et al., 1998; Jansen et al., 2003) and that 'opinion clustering' can cause such outbreaks (Salathé and Bonhoeffer 2008).

Most of the informants who favoured mandatory influenza immunisation for HCWs had accepted the vaccination previously; this concurs with previous research (Douville et al. 2010). However, there were a significant number of influenza vaccine acceptors who were, nevertheless, against mandatory vaccination.

Motivating Healthcare Workers to Enrol in the Network

In contrast with mandatory vaccination policies, which can be seen as coercive, there is also debate around whether the use of rewards or incentives for HCW influenza vaccination is ethical (Anikeeva, Braunack-Mayer, and Rogers 2009). Luyten et al. (2013) found that HCWs were more likely to prefer financial incentives over mandatory vaccination policies. A KI at LHB B proposed that such incentives would lead to higher immunisation rates, as had been proved in private sector organisations, but reported that a suggestion to their LHB Executive Board to insert such a policy was rejected:

> *I had made a suggestion but was told I couldn't go any further with it, is that everyone who turns up for a vaccination should be offered the opportunity to have a £100 in Marks and Spencer vouchers. Because if you go to another or any private sector organisations, as long as you've turned up and you're name's gone in the diary as having had a flu vaccination, you stand an equal chance as anyone else of having some type of reward. It's not much but... A prize draw, yeah. A hundred quid or something, there's a first prize, a second prize. You can take it down as long as you want to. And I suppose the thing that sticks in my mind, for those people who we are not picking up, the fundamental question is you have to be on the wavelength of the individual who says no. "What's in it for me?". As it is, what's in it for me, not a lot really because my*

> *boss is being awkward and won't give me the half an hour to go to the Occupational Health Department. If it happened to turn up while I'm on holidays, or if it happened to turn up when I'm not on the right shift, I don't mind a sore arm for 2 or 3 days, we can cope with that. But is there anything worthwhile because they're obviously not seeing it as being the health benefits.*

Given the evidence for HCW influenza immunisation being economically effective[125], it would seem that an incentive programme could also prove economically beneficial for healthcare organisations if the incentive inserted into the network was sufficient to facilitate the flow of sufficient vaccines into HCWs. OH informants also commented on the facilitative nature of financial rewards for vaccines to flow through GPs into their patients, including HCWs, while LHBs are unable to access such payments for vaccinating staff.

Rationing and Influenza Vaccines' Access to Healthcare Workers

The recording of how many influenza vaccines reach HCWs, and by extension, how many HCWs they do not reach, is an ethical moment in this immunisation programme. As a sociological study it is important to consider what influenza immunisation uptake rates actually mean. These statistics are about the monitoring and evaluation of a specific group of people against other groups:

> It is a scientific framework about measurement and attribution of value...evaluations in one location...[are] combined and compared with evaluations that have taken place elsewhere and so make possible the development of universal truths – for example, about the effectiveness of a health intervention...it is about simplification and loss of

[125] See Chapter One.

> complexity-but it is also about universalisation, the loss of situatedness, and the privileging of scientific explanation (Singleton 2005: 284).

These statistics can, therefore, be seen to 'represent the health of a body population' (Coutinho, Bisht and Raje 2000: 656). Furthermore, as Rosenberg (1989: 9-10) highlights of immunisation uptake figures:

> [They] also provide an implicit moral structure that can be imposed as an epilogue. How had the community and its members dealt with the epidemic's [pandemic's, outbreak's or 'normal' winter influenza season's] challenge? Not only during its reign but- importantly-afterwards.

It is important to highlight that influenza is the only virus and vaccine to have achieved the insertion, through the mobilisation of human actants, a requirement for UK healthcare organisations to report vaccination uptake by adults for HCWs and other at-risk groups. In addition, it is not only the UK that monitors the annual uptake of influenza vaccines by HCWs and other groups.

Another understanding is that uptake is only achieved with concomitant availability of vaccines, both in terms of physical vaccines, human vaccine deliverers, prioritisation of different HCW groups, and timing and location of immunisation clinics: 'Once we put human actions into social context, the problem takes on a different emphasis. The biomedical model of uptake rate becomes an issue of access…' (Chiu and Knight 1999: 100). In addition to duties and obligations, citizens under the new PH have rights, for example, to be able to access preventive health technologies such as influenza vaccines, in order to stay healthy and be

productive citizens. Smith et al. (2004) propose that society has an economic responsibility to create conditions, such as the provision of vaccination programmes, to prevent the spread of infections. Kotalik (2006) concluded that an ethical obligation exists for PH authorities to make sure that health care professionals are vaccinated[126]. Other studies (Singer et al. 2003; Tamblyn and Kotalik 2003) have called for a reciprocal duty for healthcare organisations to 'make working conditions as safe as possible' (Kotalik 2005), including the provision of training, protective equipment and pharmaceuticals, appropriate contingency workers and workplace organisation to minimise the risk of infection, not just for HCWs but also for other people working in healthcare organisations, who may also be at risk from infection and psychological distress, particularly in pandemic situations. Furthermore, Singer et al. (2003) propose that healthcare organisations have a reciprocal duty to HCWs, in that they should support them, have workable emergency plans in place and acknowledge the difficult and dangerous nature of their work in such situations. KIs at both LHBs concurred with these studies; as one at LHB B exemplifies: '*I think as an organisation we should have a duty of care to our staff, you know we've got a duty of care to our patients so staff should be no different'.* However, a KI proposed that what HCWs' think their needs are, may also have been inserted by the LHBs in the first place: *'So in a way we should be meeting the needs of the people that we employ. We also need to educate the people we employ, to make sure they realize what their needs are. You know it's a two way thing'.* The lack of information in the network, as discussed in Chapter Six, may also have ethical implications: *'I don't think you can do anything, you can't make anyone have anything mandatory can you? As a human right my feeling is*

[126] This obligation can be seen to be in ethical tension with the ethical obligation already outlined for HCWs to accept influenza immunisation to protect others, particularly patients.

you probably have to make a choice, an informed choice about something'. Do patients also have an informed choice not to be infected with influenza by HCWs?

Currently in UK NHS organisations, however, only frontline HCWs are prioritised for influenza vaccination. This situation highlights NHS organisations' role in rationing resources (Klein 1995). Light and Hughes (2001: 565) proposed that 'it makes sense to locate the sociology of rationing within a wider sociology of resource allocation' and highlighted that the use of the term rationing in healthcare is part of the increasing 're-coding' using concepts from economics. Hedgecoe (2007: 102) proposed that bioethics has neglected 'how rationing decisions get *implemented* and their effect on how clinicians treat patients'. In this study, this would be how influenza vaccines travel into, and in which, hospitals and HCWs[127]; and their effect on how OH and non-OH vaccinators associate with other HCWs who are potential vaccinees. Light and Hughes (2001: 560) describe these rationing decisions as: 'the micro-politics of rationing as a struggle over definitions, reflecting different situated interests and perspectives'.

In prioritising only frontline HCWs for influenza immunisation, national organisations have passed on the responsibility to decide whether to extend the availability of influenza vaccines to non-frontline HCWs to healthcare organisations, such as LHBs. In this study, the experience of the pandemic vaccination programme was reported by KIs at LHB B to result in this LHB choosing, after the suggestion by KIs and support by the Medical Director[128], to offer

[127] This was examined in detail in Chapter Five.
[128] See Chapter Five.

ostensibly all people working on their premises the opportunity to be vaccinated against seasonal influenza (for example, students, agency staff, non-HCWs and contract workers), beginning in the 2010-11 winter influenza season:

> *I think one of the lessons that we learned from this [the pandemic] was that umm if you're trying to encourage vaccinating large numbers of people, if you're trying to push the immunity up of the population within your workforce you just say there's no barriers, if you work for this health board, you get vaccinated.*

As I discussed in Chapter Five, this work done by the Medical Director at LHB B was implemented in the form of a hybrid actant, a PGD. The insertion of this new PGD into the LHB network was important because it gave OH nurses and vaccination champions the legal power to vaccinate staff that were not identified in the 'Green Book' for occupational influenza immunisation.

The previous informant proposed that the A(H1N1)pdm influenza virus did work in persuading OH professionals that non-frontline workers should be enrolled into LHBs occupational influenza immunisation network:

> *we felt that learning again from pandemic, you have a queue of people waiting and they got to the front and they weren't eligible because they worked in an office...and then they were upset and they were angry. So that happened quite a lot...It's like the haves and the have nots...You know we were really scraping the barrel to give people vaccine.*

Another KI also proposed that the pandemic drew HCWs' attention to the ethical issue of resource allocation of influenza vaccines for HCWs: '*The other thing, there was the employee response "why does that person get a vaccination and I don't?" and that "I'm not as important as them'''.* However, LHB B still does not order sufficient vaccines to cover 100% of staff and as a result the programme remains only 'in potentia' open to all. LHB A also has to deal with this ethical issue: '*We have issues with non-healthcare workers wanting vaccination'.*

Reid (2005: 354) proposed that:

> The advantage of recognizing a broader social contract underlying the duty to care is that it brings all involved in supporting, maintaining, and running a health care facility under its umbrella, so we can recognize that all health care workers – from medical to administrative to maintenance staff - face a common risk and burden of psychological distress, and face relevant moral dilemmas.

KIs at LHB B expressed similar positive views:

> *So we opened it up and they said they felt really valued the fact that um that it was now opened up to them... these are people that we don't call frontline staff but they're porters, they're receptionist staff, these are people that are dealing with patients on a day to day basis and are going to spread it around like billy-o but also are vulnerable themselves... they're just as valuable as anybody else and I think that's the thing is that there is a perception you know, and I do understand why the CMOs target only links round frontline staff but for us all our staff are valuable, and this is a way of*

demonstrating that to them. We've got plenty of vaccine, so let's do them and we'll put the effort into delivering it, we'll do any comers.

Furthermore, a KI proposed that being inclusive means that OH agents no longer have to spend time acting as border control officers, stopping the flow of vaccines due to non-clinical reasons into some people working on LHB premises: '*it made staff feel valued, it stopped the arguments, took the pressure off Occupational Health staff trying to police who could and who couldn't'.*

In addition to the rationing of influenza vaccines, the ethical issue of resource allocation of influenza vaccines in terms of their accessibility is also important, as a KI at LHB B contended: '*I think it's our responsibility to make sure it's available for them when they're working'.* Prior to the 2009-10 pandemic, access to influenza immunisation was for the most part at OH departments, particularly at LHB B. Informants proposed that non-mobile vaccination clinics were a barrier to vaccination and that access to immunisation was still a problem even post-pandemic, as an ED doctor and the previous KI from LHB B asserted:

We wouldn't allow them to go up during the shift... By the time they go up, they you know recover after and come down; we couldn't spare staff for that length of time.

we do do them in the evenings for night shifts and we've done it early mornings for night shifts as well, so that we've got availability. It's difficult for them though because sometimes there's only on a few people on a shift so to be able to be released to just get your jab done. Even if we go round the wards they'll still be.

This is a particular issue in the smaller community hospitals where fewer mobile vaccination clinics are held.

An OH professional reported that some clinical HCWs had been offered the opportunity to access mobile vaccination clinics, whereas others had not. Again this was dependent on the OH department's analysis of which frontline HCWs' were most at risk from influenza infections:

> *we always went to high risk areas. By that I mean neo-nates, ITU, A&E, CCU. This is where the patients were high risk patients then. So we've always gone there and made a visit to those areas because staff you know, we just class them as high risk and we've always done that for flu vaccines.*

Another KI at LHB B reported that influenza vaccines in LHB B have benefitted from easier access to some doctors: '*with the doctors you've got to go find 'em, they don't necessarily pitch up at clinics so what we do with them it's very much almost like make it easy, take it to them'.* Could this be why doctors have higher uptake rates than nurses and midwives in Wales?[129]

This practice may also have another ethical dimension, in that doctors who are more likely to be men, than some other health professional groups, such as nurses and midwives, and that this may lead to a gendered inequality of access to occupational influenza immunisation.

[129] Medical and dental staff had an uptake of 47.3% in the 2013-14 season, whereas registered nurses and midwives only had 41.1% (https://www.wales.nhs.uk/sites3/page.cfm?orgid=457&pid=55714).

Other health professionals also have busy lives, like doctors do, so why should one group be given preferential treatment? It could even be argued that nurses, given the closeness of contact and time spent with patients, have a greater clinical need for influenza immunisation than doctors. The HCWs most vulnerable to influenza infection may not have the time or money to attend for vaccination out of work hours and this may affect women more with personal caring responsibilities.

A KI at LHB B suggested that the PHW frontline HCW influenza immunisation target of 50%, inserted into the Welsh LHB network in 2011, should ethically only be inserted with concomitant extended access to the vaccines, in terms of non-OH department vaccination clinics: '*I guess that um it's no good saying that we need to have 50% of our workforce vaccinated unless we give them as organisations the ability to access it. And I think that every opportunity that we've got we should be able to access it'.* While, a midwife at LHB A reported that if HCWs are in an additional at-risk group from influenza, they are in effect unenrolled from being able to access the occupational influenza immunisation programme at the LHB: '*I think the problem is if you're at risk they say go to your GP because the GP, I don't know whether it's to do with funding or supplies or whatever. But they've got enough for their patients that are at risk'.* Another midwife at LHB A proposed that occupational influenza immunisation should be available at work rather than having to go to their GP:

> *if it's more convenient for me to go to Occy Health so I'd rather go and do it, you know twenty minutes when I'm in work, or before work, or after work, rather than, as...said, the struggle to get an appointment and they only do Saturday mornings, I work night shift on the Friday and all the rest of it because I think we work full time, committed to*

the job and that's fine but it's quite nice to have a life outside as well and I don't really want to give up a day off to work it around a vaccination appointment that I could have more conveniently at another time.

However, a midwife at LHB A reported that in the season following the pandemic 2010-11, seasonal influenza vaccines were unable to access some LHB staff because other non-LHB staff, LA workers, had been enrolled into the LHB influenza immunisation programme network: '*I think the year before last, they didn't have enough because I think the council had bought some and all the council workers were going to the hospital and they were having it. That's why they didn't have them so I was lucky that I was able to have it'.*

It could be argued that NHS organisations have failed to provide vaccines with sufficient access to HCWs, education and vaccination clinics; and that this may affect some groups more than others. For example, women, HCWs from lower socio-economic groups and those working at smaller healthcare institutions.

In addition, there is something prior to the discussion about the rationing of resources in this network. Thus far I have not considered the emphasis on HCWs and healthcare, rather than people who are working with other sorts of high risk and vulnerable populations in closed environments or institutions that facilitate transmission of influenza and despite being populated by vulnerable people in health terms. For example, people working in or residents of prisons, psychiatric hospitals, community facilities for people with learning disabilities, are also at high risk of influenza outbreaks, epidemics and pandemics. It is also important to ensure the health of other public servants, such as police and fire officers, but they are not

prioritised for seasonal influenza immunisation[130]; furthermore, they were not prioritised for pandemic influenza immunisation during the 2009-10 pandemic. Why do the values work as actants in one setting, but not appear to in others? Do HCWs have a better moral claim to influenza vaccines than these other actants[131]?

Conclusion

Bioethics considers how things should be; as a sociological analysis this chapter has considered how they actually are (as contended by HCW informants), and focuses on the institutional-cultural context of this immunisation programme. This chapter has examined the ethical moments of HCW influenza immunisation as experienced first-hand by HCWs and in doing so has attempted to address the empirical deficit in bioethical studies.

Bioethical studies have concluded that there should be for everybody (HCWs and non HCWs) a duty to avoid infecting yourself and others, and a duty not to harm; and, in addition, that there is a duty to treat and a duty of care for HCWs to their patients, and that this is applicable to patients with influenza and HCW influenza immunisation, respectively. However, some

[130] The ECDC (2015) has provided a more complete list: Police officers, firefighters, border/immigration control/ customs, veterinary service workers, transportation sector employees (e.g. ground, rail, air, sea and inland waterways), tour guides, educational staff (e.g. primary/secondary schools, preschool centres, kindergartens, crèches), community services (energy, electricity, water), poultry and swine industry workers, families raising swine and/or poultry, people in regular contact with live swine, laboratory workers (excluding medical/public health laboratories, but working with avian influenza viruses in the environmental/ academic sector) and wildlife environmentalists (workers who work with birds, e.g. bird ringing), individuals with frequent exposure to crowds, abattoir and zoo workers, volunteers for first-aid and relief organisations, and Social-Care Workers. Only the last two groups are currently prioritised for seasonal influenza immunisation in Wales, in addition to frontline HCWs.

[131] I think this is an important issue to take note of but I am not going to discuss this issue any further in this thesis because it is not the focus of this study.

HCW informants have denied that there is a duty of care to accept influenza immunisation and others are unsure, despite this duty being outlined in the 'Green Book. I also argued in the chapter that this duty of care for HCWs to accept influenza immunisation is gendered.

Some HCWs also have a duty to promote influenza vaccination to their patients and to other HCWs. This raised the question of whether it is ethically acceptable for HCWs to promote a health measure while declining the offer yourself. Such promotion can become pressure for other HCWs to accept vaccination or to sign a declination form; is such pressure ethically acceptable under a voluntary programme?

Mandatory immunisation of HCWs was also considered. Bioethicists are still divided on this issue, as were the HCW informants. The difficulties of inserting a mandatory programme into the UK network were revealed to be considerable, and were social, cultural and economic in nature; and informants contended that these difficulties would be worsened by the insertion of exemptions into the network. With some informants even suggesting that a mandatory programme would result in lower uptake. Other informants drew attention to the mandatory nature of other OH procedures in the NHS, particularly HBV vaccination, and to mandatory health requirements in other professions. I concluded that HCW immunisation, including influenza, is 'in potentia' mandatory already but that this potential is not being mobilised because of the difficulties already mentioned; the question was also posed whether other factors are involved.

Incentives for HCW influenza immunisation to potential vaccinees and vaccinating organisations were proposed as an alternative to a mandatory programme by informants, who highlighted that other HCPs and organisations have access to these. I concluded that such incentives could, given certain circumstances, be successfully inserted into the UK network.

Finally, the chapter considered the reciprocal duty of healthcare organisations to HCWs in providing access to influenza vaccines and education about influenza. Bioethical studies have concluded that such a duty exists. However, informants reported that not all HCWs have equal access to influenza vaccination. Frontline HCWs are the only ones that are prioritised for influenza vaccination in the UK and even some clinical HCWs 'are more equal than others'.

Furthermore, some health professional groups have easier access to CPD relating to influenza and vaccination. This inequality does not seem to be based on risk of infection or transmission but on profession, i.e. doctors over other HCWs. I put forward evidence for the benefits of prioritising all people working on NHS premises for influenza immunisation, as LHB B has 'in potentia' done; although 'in actu' supplies of influenza vaccines and vaccination clinics in LHBs are still not sufficient to fulfil this prioritisation, despite the insertion of the PHW influenza immunisation target into the Welsh network.

In conclusion this chapter has revealed the importance of HCWs' ethical values as actants in the UK HCW influenza immunisation programme, in addition to other actants which were

identified in the previous chapters. In the following, penultimate chapter, in this thesis, I provide a synthesis of these chapters, and consider how the vaccine's journey is shaped by these heterogeneous dimensions of the network.

Chapter Eight

Mapping the Network

Overview

In this penultimate chapter, I map the network that I have described in the preceding four empirical chapters. In particular, I focus on some key aspects of the network, including: durability, temporary stability and instability in the network; competition in the network; processes of inclusion and exclusion in the network; coercion, incentives and nudges in the network; the pandemic and post-pandemic networks; the indisputability of the network; and finally, active resistance, passive acceptance and active demand. These aspects also answer some of the ANT-framed research questions posed in Chapter Two and where they do this is indicated with a re-iteration of the relevant research question. In addition, I compare my findings with previous research, explain why an ANT approach has made a difference to the study, provide policy implications that follow from my findings and, finally, consider the future of the network.

Durability, Temporary Stability and Instability in the Network

This section responds to the research question: *Has this network achieved durability, or at least temporary stability? And if not, why?*

This network has achieved durability, in that it has been in existence since 1999. However, despite the long-established prioritisation of frontline HCWs' for seasonal influenza immunisation, this does not mean that it is a stable network or that it has always been particularly successful; at least in terms of recorded frontline HCW vaccine uptake. Despite the longevity of the programme, uptake of influenza vaccines by HCWs in the UK has been characterised as 'low' or 'sub-optimal'[132], particularly prior to the 2009-10 H1N1 influenza pandemic; and the 2009-10 H1N1 pandemic, seasonal vaccination uptake rates by frontline HCWs in the UK has remained below 50% since the 2009-10 H1N1 pandemic, as was the pandemic vaccine uptake. In addition, what low means is not clear; and no target level for herd immunity has been inserted into the network

Furthermore, informants, including OH professionals, commented on the perceived relatively recent nature of the HCW influenza immunisation programme, despite its duration of more than a decade, indicating influenza's failure to enrol and mobilise HCWs as vaccinators and vaccinees in this network; at least, prior to the 2009-10 pandemic. An OH informant highlighted that LHB B had given influenza vaccines the same focus as other vaccines prior to the 2009-10 pandemic. Seasonal influenza vaccines had competed unsuccessfully for OH

[132] What this actually means is discussed further in Chapter One.

departments' attention prior to the pandemic and some OH were still ambivalent about the immunisation programme post-pandemic. This is important because, in Chapter Five, I identified OH staff, particularly nurses, as obligatory passage points in the network, responsible for the majority of the planning, organisation and administration of the immunisation programme.

The vaccines encounter a variety of LHB actants which have to be mobilised to allow the vaccines to access the LHB. OH actants, particularly the OH nurse manager, have to be mobilised to try to persuade the medical director that the LHB needs to enrol sufficient funds to purchase the vaccines. How many vaccines is needed is in turn dependent upon and limited by previous uptake of influenza vaccines by HCWs in that LHB and by the competition for LHB funds for influenza vaccines from other 'target groups', i.e. those defined as being at risk from influenza for reason other than being a HCW (e.g. medical condition or age).

During the pandemic, WG were enrolled to fund and provide the pandemic vaccines and vaccine giving equipment. However, informants problematised the speed with which WG inserted these resources into the LHBs and some criticised the quality of the equipment in mediating the insertion of the vaccine into HCWs.

While OH professionals, particularly OH nurses, were revealed to be obligatory passage points in the network, sometimes they have to use mediators to mobilise staff as vaccinees from a distance; for example, vaccination champions, managers and senior nurses. However, their

enrolment was typified as uncertain and unstable. This is a particular issue where vaccination champions may not easily be replaced in the network; a vaccination champion proposed that in order to successfully facilitate the flow of vaccines champions need to be enthusiastic and persuasive. Some nurse managers were even reported to obstruct nurses from acting as vaccination champions, due to competing priorities. Vaccination champions are important actants in the network if LHBs want to increase their uptake without employing additional vaccinators. Some OH and non-OH vaccinators also proposed that vaccination champions are more successful, including during the pandemic, in facilitating the flow of vaccines through their accessibility (in terms of both time and space) and ability to target non-vaccinees in a dynamic work environment and/or the greater trust that they induce from colleagues. However, other OH and non-OH HCWs suggested that vaccination champions cannot facilitate the flow of vaccines as successfully as OH actants, or should not, because of patient confidentiality, ensuring the cold chain and because of the difficulties in monitoring who is vaccinating who. However, it was proposed that vaccination champions could target colleagues for vaccination, through the use of local knowledge, that OH agents would be unable to do. Ensuring the cold chain was reported to be an issue during the pandemic because of a lack of refrigeration equipment for seasonal and pandemic vaccines, and because the vaccine came in ten dose vials, there was a propensity for vaccine wastage. However, others disagreed with this last point and proposed that pandemic vaccines did not even need to be kept in a cold bag, and that this facilitated opportunistic flows of pandemic vaccines. Heterogeneous informants proposed that enrolment of other HCWs as vaccination champions is necessary in order to stabilise the network and increase immunisation further. Such actants would also be important in any pandemic plans to achieve 'stabilisation in advance' (Dingwall, Hoffman and Staniland 2012). OH administrators, PH actants and

members of the infection prevention and control team were also revealed to be involved in facilitating the flow of vaccines.

Despite this temporary stabilisation, the network still has to be reconstructed every year through reassembling: the seasonal influenza vaccine to include the novel, annually mutated viral strains; the administration and administrators of the programme; and, the HCWs as potential vaccine recipients. When this re-assemblage would be completed was also unstable, i.e. the date when the seasonal programme started depended on pharma's supply of vaccines, OH staff availability and whether awareness of the campaign had entered HCWs' knowledge assemblages. If this aspect of the network could be stabilised it could increase uptake and people would be protected sooner in the season.

I characterised the knowledge assemblage as a dynamic part of the network. HCWs' awareness of the programme is unstable as other priorities compete for their attention during the months when the programme is not actually being delivered. Each year, this part of the network has to be re-assembled through the insertion of training (which is not mandatory and competes with other mandatory and non-mandatory training), immutable mobiles (e.g. media reports, including social media, LHB intranet messages, emails and posters) and direct associations (i.e. word-of-mouth). I highlighted that media messages are unstable, as other stories compete for coverage. In addition to official messages competing unsuccessfully for HCWs' time, this part of the network is also affected by whether the source of information is trusted and HCWs' lay epidemiology and folk models of disease. Informants proposed that

there is a lack of trust present in the network, as far as official messages from the LHB was concerned, and that HCWs were more likely to trust unofficial messages from colleagues and the media. Informants proposed that vaccination champions could facilitate the flow of information to colleagues as part of their vaccinating role, particularly in pandemic situations.

The limitations of inserting knowledge into HCWs' and HCWs' beliefs around influenza and immunisation were also revealed in Chapter Six. Despite the limitations of the deficit and rational models of knowledge and decision-making, respectively, several informants from both LHBs proposed that HCW knowledge is a factor in the acceptance and non-acceptance of influenza vaccines. As a result, it was in effect claimed that influenza viruses and vaccines had failed to insert enough information and knowledge about influenza viruses and vaccines into HCWs before and/or during the 2009-10 pandemic, because they competed unsuccessfully with other actants for the HCWs time for education, knowledge and training. Some informants proposed that this has changed since the pandemic, i.e. due to the work of the pandemic and post-pandemic viruses, but others disagreed, and they have still failed to insert themselves as compulsory training modules.

Informants identified a number of knowledge deficiencies around influenza viruses and vaccines, including: seasonal influenza is not a serious illness; the vaccine can give you influenza; lack of understanding of the difference between colds and influenza; the pandemic vaccine was a live vaccine; HCWs do not need vaccination if they are not in a specific risk group due to age or medical condition; pregnant women should not be vaccinated against

pandemic or seasonal influenza; midwives do not work with risk groups for influenza; asymptomatic/mild influenza; viral shedding pre-symptomatically; not needing vaccination because exposure to infectious diseases gives HCWs strong immune systems; patients transmit influenza to HCWs and not vice versa; other infection control measures mean vaccination is unnecessary. The penultimate deficiency reported was shown not to apply for some HCWs during the pandemic and even having one of the medical conditions does not mobilise some HCWs, even post-pandemic.

Other informants highlighted the role of unofficial sources and personal experience in inserting information about influenza into HCWs, i.e. from colleagues, the media and first had, respectively. But these are unstable sources and ones that may not insert the messages that a healthcare organisation wants them to insert. However, with sufficient work done by human (i.e. vaccination deliverers and champions) and hybrid actants (i.e. local posters and intranet announcements), influenza vaccines can successfully insert themselves into HCWs without the need to insert more formal knowledge into the HCWs.

Moreover, the healthcare network itself was revealed to be unstable and changes in the flows of vaccines, seasonal and pandemic, were entangled in wider political and practical changes. The first seasonal vaccines in the 1999-2000 programme and the H1N1 pandemic influenza vaccines had to travel through the Welsh HNS network at particular times of instability, i.e. devolution of health to WG and new LHBs were being enrolled into the network, respectively. In Chapter Four, I also illustrated that the changing form of the healthcare organisations during the pandemic also acted as a mediating force in the pandemic and subsequent

seasonal network. This instance of instability was reported to have had a negative impact on the flow of pandemic vaccines. This was manifested through difficulties in communications between pandemic programme administrators in LHB A and in newly enrolled vaccinators not actually being mobilised as vaccinators because LHB re-organisation competed more successfully for their time and because the training required to vaccinate did not enter the network. However, whether this was a positive or negative force was a contentious issue among the informants and this may have been dependent on which LHB they became part of, as the re-organisation affected the two LHBs differently, i.e. by different changes in scale.

Nevertheless, human actants and organisational culture may have remained the same, or at least relatively unchanged, in these new organisations. Some informants argued that organisational culture can remain despite a change in organisation, particularly in those smaller and/or more rural hospitals where organisational (i.e. LHB, rather than hospital) identity may be of little relevance and/or cognisance. Despite this, organisational change is always disruptive, particularly in emergency situations, such as influenza pandemics. Instability of other actants was also revealed; for example, PH agencies and UK governmental agencies. In addition, informants reported that PH actants' mobilisation as vaccination champions is unstable as other priorities may compete for their mobilisation in future.

Despite increases in numbers of vaccines reaching HCWs since the pandemic, the immunisation programme was revealed to be inherently unstable due to work of influenza viruses: the variable severity of influenza seasons; the variable effectiveness of vaccines from

season to season, with a mild season having the potential to unenrol HCWs from that season or the next season's network; an effective vaccine could be confused with a mild influenza season; the unpredictability of outbreaks, epidemics and pandemics; and, an ineffective vaccine persuading HCWs that vaccination is not worth the time, effort, or off-target effects. It was also reported that the instability of influenza activity, and associated stories about this, within a season means that vaccination services have to anticipate, be ready for and be responsive to a surge in demand by opportunistically and promptly facilitating the flow of vaccines at such times.

Competition in the Network

In this chapter, I have already considered some facets of competition in the network. This section, and the subsequent one on processes of inclusion and exclusion in the network, further address this aspect of the network, in order to more completely answer the research question: *How does this network intersect with other networks and become part of extended actor-networks?*

This network intersects with other healthcare networks and competes, sometimes successfully and sometimes unsuccessfully, for the actants' attention in the network. For example, OH professionals are also involved in providing other all-year-round services, which do not stop during the immunisation programme, and which informants characterised as their 'normal' or 'necessary' work, in contrast with the immunisation programme. OH doctors' mobilisation was revealed to be particularly unstable or has not been achieved at all. OH and

non-OH informants also testified that OH services are under resourced in Wales. The network also competes with potential vaccinees' other networks in which they are enrolled. It competes for their time and attention which could be given to competing networks, such as their professional role or their personal role, e.g. as parents.

Knowledge practices in the immunisation programme compete with vaccination for vaccinators', i.e. OH and champions, mobilisation. Despite influenza being the only virus and vaccine to have achieved the insertion of[133] a requirement for UK healthcare organisations to annually report uptake of influenza vaccination for HCWs (and other adult at-risk groups), the reporting of uptake was revealed to be problematic. OH informants problematised and complexified this record keeping. Informants proposed that accuracy in reporting for some LHBs was a problem and that other actants as vaccinators, such as GPs and vaccination champions, exacerbated this problem in the network. Furthermore, this role was reported by the same informants as recently becoming an even more complex task. However, a vaccination champion proposed that the record of vaccinees enables the targeting of HCWs who have not yet received immunisation by vaccination champions but that this is not possible for OH vaccinators, because of their larger cohort of potential vaccinees.

In spite of these issues, the NHSs in Wales and England have inserted these documentary practices and associated immunisation targets into their networks. These uptake records facilitated both the flow and limitation of vaccines, particularly during the pandemic when

[133] I.E. Through the mobilisation of human actants.

weekly reports of vaccine uptake to WG mobilised the flow of more pandemic vaccines into the LHBs; and made visible the LHBs' success or failure in meeting the 50% target post-pandemic. However, the aggregated LHB uptake record also worked to blackbox professional, departmental and hospital variations in uptake and only includes frontline HCW uptake. In addition, another monitoring system, the yellow card, was reported to be underutilised. Reporting of uptake was also understood to have unintended consequences for HCWs' trust in the immunisation programme and could actually work to stop HCWs being mobilised as vaccinees. Nevertheless, informants saw a role for uptake figures to mobilise HCWs as vaccinees through the mediation of social norms.

Processes of Inclusion and Exclusion in the Network

There was also competition in the network for vaccinators' attention and for vaccines in terms of processes of inclusion and exclusion that are at work in the network, with informants reporting that vaccines travelled more easily into some HCWs than others. For example, vaccines seemed to have easier access to those working: in more urban and/or larger hospitals; in particular departments, such as ICU and PICU; in medicine; during week days; as HCWs, rather than non-HCW roles; for the LHB, rather than as agency/bank staff, subcontractors and students. This access was facilitated by vaccinators being mobilised to target these particular HCWs. While informants were included partly due to their working in a particular large hospital, some of the informants are peripatetic and their location in smaller and/or more rural hospitals may have been a barrier to accessing influenza immunisation. In addition, to vaccines failing to flow to smaller hospitals, those that do reach the smaller hospitals may then fail to flow through them because HCWs have less experience-based

knowledge of serious influenza infections. Furthermore, in some departments, i.e. ICU, vaccines flowed into HCWs through the mobilisation of 'de facto' mandates and through an assessment of those HCWs being more 'critical' than others. KIs reported that during the pandemic it was staff providing patient care, rather than those with patient contact, who were prioritised for immunisation.

There were also processes of inclusion and exclusion present in the flow of information into HCWs, with medical staff having easier access to such CPD than non-medical staff. However, I also found that doctors' and other senior HCWs' knowledge was lacking. The sources of information available have to be tailored to the different audiences that they are aimed at. Like the insertion of vaccines, the insertion of knowledge also has to be timed correctly so that other competing interests do not displace the programme in the HCWs' knowledge assemblages.

Informants stated in Chapter Six and Seven that access to influenza vaccines and IPC education is an issue, particularly for some professional groups and those working in some departments or with particular working patterns/conditions, i.e. nurses and midwives. It was argued that access was not related to relative need for influenza immunisation. This is even more important in pandemics where medical students and volunteers have been identified as possible additions to the frontline healthcare network. They may, however, remain unprioritised for pandemic influenza immunisation. In addition to education, knowledge about when and where vaccination clinics are taking place was identified as an issue for some

HCWs who may not have access or time to access emails. Text messages inserted into the net may be more successful at mobilising HCWs as vaccinees, a tactic which is increasingly being employed by healthcare providers to remind patients to attend appointments and to give out other information, including at the LHBs that took part in this study. Vaccination champions also have a role to play in inserting information into their colleagues.

Coercion, Incentives and Nudges in the Network

This section returns to the research question: *How are actants enrolled into, or unenrolled from, and mobilised in this network?*

I found that some HCWs are compelled or coerced to be vaccinees, i.e. through pressure from colleagues or unofficial mandates. I suggested that pressure as a method of mobilisation could disrupt the relational ontology of the network. I also hypothesised that unofficial mandates could be utilised in other settings, in the same way that they are in ICU and PICU.

In contrast, some HCWs were incentivised to accept vaccination through a belief that influenza immunisation could protect themselves, family, friends, colleagues or patients. I could not find any evidence that HCWs were directly incentivised in the two locales by the LHBs, for example, through a prize draw; and an attempt to insert incentives into LHB B by an OH agent was obstructed by LHB elite actants.

Located in-between coercion and incentivisation are 'nudges' (Thaler and Sunstein 2008). Some HCWs are 'nudged' by ethical values and social norms in the network to run immunisation programmes and to accept vaccination as a duty of care. However, I would argue that 'nudges' are not being utilised to their full potential in the network. In addition, I propose that 'vaccination/immunisation capital' could be employed, by individual HCWs, wards, departments, professions, hospitals and LHBs, more in the network. This is similar to the idea of 'hygiene capital' (Brown et al 2008), but in this case, HCWs would receive symbolic or cultural capital based on whether they have been vaccinated or not. While I did find some evidence of this already in the locales studied (for example, through the use of stickers to demonstrate vaccination status and visibility of uptake figures in the hospitals and wider healthcare network), I do not believe that this aspect of the network is being exploited to as great an extent, as hygiene capital is. The nursing profession in particular has a history of gaining capital from hygiene practices; this could be employed by framing immunisation as an extension of other IPC practices, like hygiene. However, like Latour's (2005) doctors struggled to accept the enrolment of preventive medicine and microbes, some HCWs seem to find it difficult to accept that hygiene, while necessary, is not sufficient on its own to stop the spread of influenza.

The Pandemic and Post-Pandemic Networks

This section considers a particular time in the network, i.e. the pandemic and post-pandemic periods, in order to consider: *How has this network changed over time, particularly in light of the H1N1 influenza pandemic of 2009-10?*

Informants reported that pandemic influenza vaccines were important during the pandemic because of failures in alternative infection prevention and control technologies, i.e. antiviral medication and face masks. In Chapters Five and Six, informants proposed that in addition to the H1N1 influenza virus itself, other viruses, i.e. H5N1 avian influenza and SARS, and media and official messages about them, were involved in mobilising them as pandemic H1N1 influenza vaccinees. These official messages may have included those concerned with UK and international (i.e. WHO) pandemic planning. However, some informants proposed that the H1N1 was too mild to mobilise some HCWs as vaccinees and some proposed that side-effects from the pandemic vaccine observed in colleagues did work to de-mobilise them from the network and others stated that their decision was effected by concerns about the pandemic vaccine safety and the novel nature of the vaccine; despite the fact that seasonal vaccines are annually novel. Nevertheless, several informants, including an OH professional, also reported that the presence of the H1N1 vaccine in the post-pandemic vaccine is continuing to mobilise HCWs as vaccinees, but some informants' mobilisation has yet to be stabilised for a variety of reasons (i.e. complacency, variable effectiveness and forgetting to), which I would argue are due to the variable nature of annual influenza outbreaks. The increased acceptance of seasonal influenza immunisation post-pandemic is also due to increased access to vaccines, in terms of actual vaccines, vaccinators (OH staff and vaccination champions) and mobile

vaccination clinics, and the visibility of these (i.e. yellow t-shirts, vaccination bags, badges, photos and posters).

LHB B facilitated the flow of pandemic vaccines with an immutable mobile (i.e. a fact sheet), which gave vaccinators more time to vaccinate, instead of having to counsel potential vaccinees to accept vaccination. However, informants proposed that the pandemic programme started late at LHB B, which meant that HCWs had to be mobilised separately for the seasonal and pandemic programmes. It was also suggested that the H1N1 virus travelled to LHB B sooner than other LHBs because of its geographical proximity to England and a motorway coming from England. Whereas, LHB A employed a countdown to facilitate the pandemic programme entering the knowledge assemblage of the HCWs earlier. LHB A also facilitated the flow of pandemic vaccines by deploying mobile vaccination clinics, whereas LHB B did not. The location of the OH department and parking were reported to be obstacles for the pandemic vaccine in both LHBs; as was the diversion of vaccines and vaccinees to vaccinate local authority staff. This was in addition to the usual seasonal prioritisation of vaccines for primary care patients over HCWs.

While OH informants problematised their mobilisation during the pandemic, in terms of the effect on other networks that they are enrolled in, they also testified that the pandemic programme has helped to stabilise the seasonal programme through the enrolment of other LHB staff in planning and delivering post-pandemic programmes. However, these enrolments were reported to be unstable during the pandemic due to competition from LHB re-

organisation. Informants also proposed that a more severe pandemic would require the mobilisation of more vaccination champions and nurse managers in order to vaccinate staff quickly to stop the flow of pandemic virus rapidly. This was also reported to be an issue in seasonal programmes. If a restricted number of OH agents and vaccination champions deliver a seasonal programme it takes longer than if more vaccinators are mobilised and therefore patients, HCWs, the wider community and LHB are at risk from influenza for longer. What is important about the programme is not just how many HCWs are vaccinated, but when in the influenza season this happens. At the moment this still is not taken into account in the immunisation programme.

In addition, pandemic vaccines were defined as difficult to insert into HCWs, in terms of the time taken to draw up and mix the vaccine, the low quality vaccination giving equipment supplied by WG and the viscosity of the vaccine. Some informants testified that this caused extra discomfort for vaccinators and vaccinees and could have had a knock-on effect on other potential vaccinees. OH informants suggested that they were better than vaccination champions at mitigating the potential for discomfort in vaccinees and their success in counselling potential vaccinees to become vaccinees through their longer enrolment, and therefore more experience in the network. The supply of pandemic and seasonal vaccines and equipment from WG during the pandemic was also reported to be unstable.

In addition, sometimes there seems to have been too many actants in the net during the pandemic; for example, too much information for managers to filter to staff, too many face-

to-face meetings and too many immutable mobiles, i.e. different sources of information leaflets, about pregnancy and pandemic influenza immunisation for pregnant women may have resulted in them not becoming pandemic vaccinees.

Influenza vaccines, seasonal and pandemic, were targeted towards pregnant women for vaccination for the first time during the pandemic. However, KIs reported that some OH agents and midwives resisted the role of mobilising pregnant women as influenza vaccinees and failed to distribute their expertise between them during the pandemic; it was testified that this has changed since the pandemic. Pregnant women's enrolment was also a dynamic situation during the pandemic, with those in the first trimester of pregnancy not being targeted at the beginning of the pandemic, but subsequently they were, and still are. This enrolment has continued in post-pandemic seasonal programmes. However, a recent study found that midwives are still reluctant to vaccinate pregnant women themselves (Ishola et al. 2013).

Over time, particularly through the work of the H1N1 influenza pandemic, new hybrid actants have been enrolled into the network, particularly new vaccinees, new vaccinators (i.e. vaccination champions) and mobile vaccination clinics. In LHB B, new vaccinees have been enrolled through the broad interpretation of the 'Green Book', which has mobilised all people working on LHB B premises to be prioritised for vaccination. This has worked to curtail the processes of inclusion and exclusion which were present before the pandemic. However, the LHB is still not ordering enough vaccines to cover 100% of staff.

Despite the obstruction of pandemic vaccines in some parts of the network, some informants nevertheless proposed that post-pandemic vaccines flowed more freely through these new organisations, particularly in LHB A which had a much greater growth in HCW numbers than LHB A. Informants proposed that this was because new human actants and their associated expertise could be mobilised to facilitate the flow of vaccines in the new network, rather in the competing previous smaller networks. However, the increase in post-pandemic vaccine success in reaching HCWs was less in LHB A than LHB B. It was reported that the post-pandemic programme was unstable in the season following the pandemic because the LHB's attention was diverted to other issues and because a key actant, the immunisation co-ordinator, was not yet present in their network. In LHB B, informants suggested that the vaccination programme had been stabilised by attaching the pandemic experience to post-pandemic seasonal campaigns. This was important because the winter influenza season following the pandemic was more severe than the pandemic itself. The major post-pandemic change in LHB B was reported to be the use of mobile vaccination clinics and vaccination champions. It was proposed that these new actants have helped to disrupt the processes of exclusion which were present in pre-pandemic programmes. In addition, the PH, preventative focus of LHBs and closer associations with PHW was highlighted as encouraging preventive health programmes, such as the HCW influenza immunisation programme. However, the success of this focus was questioned in terms of HCWs' knowledge and PHWs' lack of mobilisation as vaccinators; and communication between human actants in such large networks was still reported to be an obstacle to the flow of vaccines post-pandemic. Furthermore, the mobilisation of elite actants, such as Chief Executives, was reported to be more difficult in these larger organisations because more issues competed for their attention and because associations between those in charge of the administration of the vaccination

champion and those at the top level of the LHB was no longer direct, but mediated by other human actants.

NHS Wales introduced a 50% target for frontline HCWs in the post-pandemic 2011-12 season. National-level organizations, WG and PHW, were mobilised by the work of influenza viruses, particularly the pandemic H1N1 virus, to insert the target into the LHBs and their hospitals. The target has failed to the extent that it has not mobilised sufficient vaccinees to meet the target. No LHB achieved the 50% target in the 2011-12 season; the same target was re-inserted in the 2012-13m 2013-14 and 2014-15 programmes. Informants argued that this target was not achievable in terms of resources (i.e. vaccines and vaccinators) and infrastructure (i.e. fridges), and the target was subsequently mediated by human actants in the LHBs. At LHB A, informants proposed that the target was unachievable and that this perception motivated them to insert a lower target. In this case, no negotiation with the body, PHW, who created the target, was necessary because no concomitant sanctions for not achieving the target had been inserted into the immunisation programme network. However, the targets and documentary practices present in this network can be seen as a more indirect form of state power than direct coercion (Hobson-West 2005).

Uptake was 45.6% in England and 35.5% in Wales in the 2012-13 season, and 50% and 40.6% in 2013-14[134], respectively; no data were available for Scotland and Northern Ireland. The

[134] 'Wales figure for 2013/14 season includes influenza immunisation uptake in Velindre NHS Trust, Welsh Ambulance Service NHS Trust and Public Health Wales NHS Trust which are not included in previous seasons' (https://www.wales.nhs.uk/sites3/page.cfm?orgid=457&pid=55714).

continuing problem of 'low' uptake was remarked on in 2013 with WG (2013: 4) declaring that:

> The impact on the NHS of large numbers of patients requiring treatment, as well as the front line staff becoming ill, is considerable. This coincides with other winter pressures such as other illnesses, increased slips and falls and bad weather. When combined these may threaten its ability to maintain an effective service...Particular attention is to be paid to the vaccination of front line health and social care workers (HSCWs) to reduce the risks of infection to patients and to the business continuity of the service due to staff illness or absence. Staff in at-risk groups should ideally be provided with a template letter to return to their GP to ensure their flu immunisation is recorded.

Influenza is also continuing to do work in the Welsh network. In its 2013-14 'Seasonal Flu Plan' the WG stated that:

> The delivery of seasonal flu vaccination will form part of the updated Tier 1 measures for the NHS and will be one of the key accountability requirements for each NHS Board (WG 2013: 2).

> Measures to reduce the transmission of seasonal flu in health care settings will be addressed as part of the Health Care Associated Infections programme (WG 2013: 10).

However, the work to insert vaccines into student HCWs is still left to the educational institutions rather than the LHBs: 'HBs, LAs and employers of private sector HSCWs are responsible for the vaccination of their own staff. Vaccination of students in medical or allied professions, in close contact with patients is the responsibility of their parent colleges' (WG 2013: 8).

The pandemic has resulted in the addition of more financial assistance in inserting influenza vaccines into Welsh HCWs; however what level this is at is not disclosed: 'Funding will also be made available to HBs, Velindre NHS Trust and the Welsh Ambulance Service Trust to support staff vaccination' (WG 2013: 8). However, it has achieved, the insertion of the immunisation programme into the Welsh HCAI network: 'Measures to reduce the transmission of seasonal flu in health care settings will be addressed as part of the Health Care Associated Infections programme' (WG 2013: 10).

This is important because the majority of informants reported that they did not view influenza as a HAI or HCAI, in the same way that other diseases are. Instead informants stated that they perceive influenza to be part of the community network rather than the hospital network and an informant reported that this idea was reinforced to staff during the pandemic in an effort to assuage their concerns about treating patients with H1N1. Informants also proposed that HCW influenza immunisation is not an IPC issue because the immunisation programme is not mandatory. The influenza virus has also failed to insert itself into the IPC champion role, with the HCW influenza immunisation champion being a separate responsibility. However, I propose that WG's insertion of influenza as a HCAI may not be sufficient to mobilise HCWs as vaccinees.

Following on from the belief that influenza is not a HAI/HCAI, the majority of informants who reported that they had accepted pandemic and seasonal influenza vaccination stated that they did this in order to protect themselves and/or their families rather than patients. However, some informants proposed that LHBs wanted HCWs to accept influenza vaccination during the pandemic so that staff were not away from work ill rather than to protect patients.

Another informant reported that during the 2011-12 season their LHB had changed the way that they were trying to mobilise HCWs as vaccinees, by highlighting the protection that influenza vaccination gives to patients rather than staff.

Chapter Six concluded that HCWs are heterogeneous actants with different reasons for accepting or refusing influenza immunisation, and as such, policy recommendations and interventions must also be varied. I, therefore, recommend that future immunisation programmes insert various implementation strategies, including increasing numbers of vaccination champions (HCWs, and hybrid actants such as posters, intranet announcements and the media as advocates) and vaccinators (including through the use of nurses and midwives to vaccinate colleagues), inserting influenza immunisation into the IPC champion role and inserting more mobile vaccination clinics (administered by OH and non-OH HCWs).

England has taken a different approach to Wales, with the UK Health Minister, Jeremy Hunt, announcing in September 2013 that National Health Service England is inserting a 75% target for frontline HCWs working in English hospitals. Did the pandemic influenza virus achieve this greater level of commitment by English actants through the work it did in England during the pandemic where more morbidity and mortality were attributed to the virus? If English hospitals do not achieve this target they will incur sanctions, in that they will not receive their share of £500 million extra funding which has been promised to EDs in England for the next two years. Given the late insertion of this target in terms of organising the immunisation programme (i.e. ordering vaccines and arranging sufficient staffing levels to deliver the

vaccinations) I ask whether this target has been inserted in order to fail and to therefore ensure that the UK government does not have to spend the £500 million promised to EDs[135]. Informants, quoted in Chapter Seven, argued that immunisation targets should only be inserted with concomitant access to vaccines, both in terms of physical vaccines, and location, timing and availability to attend vaccination clinics during work hours, and education and information about influenza, IPC and vaccines.

The targets in both LHBs were also subject to a process of mediation by OH professionals and other vaccinators who implemented the target and immunisation programme vis-a-vis other targets and roles that they had to meet. However, it could be argued that the target has temporarily stabilised the immunisation programme, despite neither country meeting its target, with uptake in the 2014-15 season at 55% in England and 44.3% in Wales; uptake in each of the LHBs was very similar, but English acute trusts were much more varied, with some reaching near the target level and others at around half this number.

Informants suggested that more vaccination champions need to be mobilised in order to reach the target in future. Despite the funding of vaccines not being reported to be a problem post-pandemic, LHBs are still not ordering sufficient vaccines to cover 100%, or even reach the target 50% of staff.

[135] http://www.cost-ofliving.net/set-up-to-fail-a-e-funding-incentives-targets-and-flu-vaccinations/

These targets are policy solutions that fall short of mandatory vaccination, as in some US hospitals[136]. In 2004, the BMA considered and rejected compulsory vaccination. Instead, I have argued that responsibility for ensuring uptake has been shifted onto healthcare organisations themselves.

The Indisputability of the Network

The immunisation programme is supported by formal legislation, the 'Green Book', PGDs and CMO letters. Chapter Four revealed the legal basis for this immunisation programme and proposed that this important because 'public health cannot function well unless it has strong legal foundations' (Gostin 2002:136). Despite the legal basis already present in the network however, it has failed to mobilise governmental and healthcare actants to insert and/or accept influenza immunisation. The translation of written policy and policy- in-action was shown to be a difficult and uncertain process in the network. Moreover, these actants limit the flow of vaccines to frontline HCWs. In LHB B, human actants worked to facilitate the flow of post-pandemic vaccines into all humans working on LHB property through the use of PGDs; but this was limited to the extent that insufficient vaccines were ordered from pharma to potentially reach 100% of people working on LHB premises.

While influenza has achieved the prioritisation of HCWs for influenza immunisation, they are in fact simultaneously prioritised and de-prioritised, due to influenza failing to insert sufficient resources into the net (i.e. vaccinators and vaccines). However, informants proposed that the

[136] Mandatory vaccination will be discussed further in Chapter Seven.

2009-10 H1N1 influenza virus has done work to temporarily stabilise the network, in terms of the supply of vaccines, vaccinators and vaccinees.

However, despite the GMC already stating that doctors should be immunised against serious infectious diseases some informants claimed that they were unaware of such a statement. Similarly, the success of similar statements in the 'Green Book' and in UK legislation was questioned by informants. In addition, some informants proposed that more immutable mobiles like that already inserted by the GMC, i.e. in the form of statements by health professional organisations, such as the nursing and midwifery councils, would be successful in mobilising more HCWs as vaccinees.

Chapter Four also considered the work done in this network by supra-national organisations, particularly WHO in surveillance. I would argue, however, that in HCW influenza immunisation programmes the UK's acceptance of WHO's 'suprasovereign power' has been limited to the extent that during the 2009-10 H1N1 pandemic alert levels did not initiate UK Government action because they were inserted too late and that the immunisation programme has not been supported by concomitant vaccines and staff to deliver them. In addition, it was highlighted that WHO prioritises the protection of 'vital health infrastructures', rather than human actants. Inserting a statement about the protection of patients, the public and HCWs may help to mobilise more human actants both as vaccinators and vaccinees. In addition, the Welsh NHS policy direction of PH tenets may have failed to mobilise institutionalised hospital HCWs as vaccinees. However, some informants claimed that since re-organisation closer links with and face-to-face promotion by PHW may have had a positive effect on pandemic and seasonal vaccination; but PHWs' enrolment is unstable.

In Chapter One, I also revealed that the basis for this prioritisation of HCWs for influenza immunisation, and the associated immunisation programme, rests on many dominant ideas about influenza viruses and vaccines, and HCWs. However, some of these beliefs are still debated by biomedical and social science. Furthermore, influenza has failed to insert sufficient evidence of the effectiveness of this immunisation programme and this will probably remain the case, due to the work of ethical values in this network (i.e. RCTs would be ethically unacceptable). Like Coutinho, Bisht and Raje (2000:656), I found that 'Between policy and implementation there occurs a process of mediation and negotiation. At the micro level, it is these health workers who negotiate the programme vis-a-vis a host of factors'.

The strong legislative base for the programme is in direct contrast to, and exists despite, the lack of evidence of the efficacy of HCW influenza immunisation, and for the transmission methods of influenza. This means that the programme has not been made indisputable. I also found that there is confusion about what HCW influenza immunisation[137] is for: to protect patients, HCWs, healthcare organisations, infrastructure or to provide a certain level of herd immunity. What might count as efficacy may be rather different for each of those three different objectives.

The programme cannot offer a guarantee of investments (governmental, organisational and individual) as Latour's microbes did, because the scientific argument has not been closed (i.e. black boxed) (Latour 1998: 57): 'The ratchets of scientific law [i.e evidence base], juridicial law

[137] There are also similar continuing debates about the antiviral, Oseltamivir (Tamiflu), which has been criticised on the basis of claims that were never made by pharma or DH (i.e. it won't stop a pandemic).

[i.e. legislation], and public morality [i.e. ethical values] must all be turned, one after the other, in order to force the pace of social regeneration and to make room for both the urban masses and for microbes'. This is important because informants challenged the evidence base for the programme.

The evidence base is limited by ethical values relating to clinical trials of vaccines in hospital settings and legislation is limited (i.e. mandatory vaccination) is also limited by the ethical values of the UK government. There is also a cyclical relation in that, HCWs proposed that if there was an ethical duty to be vaccinated then it would already be mandatory, and mandatory legislation may also be limited due to the lack of evidence base. Furthermore, even if the scientific argument was closed would this be enough for HCWs who do not have sufficient trust in biomedical science and who may not access the evidence base. As Chapter Six suggests, even though HCWs are supposed to be EBPs, other sources, such as colleagues, friends/family and the media are often more important sources of information.

Chapter Seven focussed on the bioethical issues at all levels of the HCW influenza immunisation programme, including potential vaccinees' ethical values as actants in the network. This was not done just for interest's sake; I regard ethical issues and HCWs' ethical values as key components in this network because they constrain the routes that influenza vaccines can take to eventually insert themselves, or fail to insert themselves, into HCWs. ANT approaches have previously paid little attention to ethical values as actants in networks. I would argue that the understanding of this immunisation programme actor-network is

incomplete without taking into account the ethical issues involved. Whether a HCW has, or believes they have, a duty to accept influenza immunisation fundamentally affects the ontology of the network. Furthermore, the ethical status of mandatory and incentive based programmes is important for healthcare organisations to consider.

In Chapter Seven, I described the complex moral assemblage that is present in the network. Ethical imperatives (i.e. for HCWs to accept vaccination, to work even when they are ill (possibly from off-target effects of influenza immunisation) and not to spend time attending for vaccination when they could be working) all compete in HCWs' moral assemblages. The dynamic and turbulent nature of healthcare, and access of vaccines to HCWs through rationing, prioritisation and exclusionary practices also entangled in this assemblage. In the real world, actants do not necessarily have the time or resources (e.g. evidential or intellectual) to reason what is the right or rational thing to do. In the practice of healthcare, the role of values or ethics as actants tends to disappear. This study has helped to illuminate the practical compromises that HCWs make every day. ANT would argue that blackboxes or inscription devices imbed the values and practical solutions of decision making. The ethical decision tends to get blackboxed and incorporated into some kind of inscription device, i.e. CMO letter/Green Book. I have unpacked some of these black boxes and exposed some of the inscription devices. Decisions tends to get translated into a technical matter, i.e. rationing according to profession/department. This is thought to be an impersonal way of adjudicating between different candidates for vaccines in an objective and neutral way; but in fact they do imbed a particular normative principle that vaccines should be allocated according to ability for HCWs and their patients to benefit, rather than by social value. This unbkackboxing helps

us to understand how this movement of values and ideals, that we call bioethics, operates. We are then led to a better understanding of what its implications for practice are; but it also gives us better ways of critiquing the practice of healthcare.

Comparison of Findings with Previous Research

At this point I return to the literature reviewed in Chapter One into the factors affecting non-uptake of influenza vaccines among health professionals, in order to compare my findings with previous research.

Like (Hollymeyer et al. 2009) I found that the reasons are complex and included: fear of side effects, including causing influenza illness (Ballada et al. 1994; Heininger et al. 2003; Martinello et al. 2003; Qureshi et al. 2004; O'Reilly et al. 2005; Wicker et al. 2009a); belief that influenza vaccines are ineffective (Goldstein et al. 2004; Weingarten et al. 1989; Christini et al. 2007; Pearson et al. 2006; Canning et al. 2005; Qureshi et al. 2004; Saluji et al. 2005; Bautista et al. 2006; Martinello et al. 2003; Nichol et al. 1996); vaccine accessibility and convenience (Pachucki et al. 1989; Weingarten et al. 1989; Decker and Schaffner 1990; Girasek 1990; Ohrt and McKinney 1992; Watanakunakorn et al. 1993; Heimberger et al. 1995; Adal et al. 1996; Fedson 1996; Doebbeling et al. 1997; Nichol and Hague 1997; Harbath et al. 1998; O'Reilly et al. 2005; Christini et al. 2007; Wicker et al. 2009a); insufficient knowledge about influenza as a serious disease (Stephenson et al. 2002; O'Rorke et al. 2003; O'Reilly et al. 2005; Wicker et al. 2009a); lack of health professionals' understanding about the risks, efficacy and necessity of influenza vaccination (Heininger et al. 2003 and Wicker et al. 2009).

In accordance with previous research I also found that, HCWs primarily accept seasonal (Stephenson et al. 2002; Bucholz et al. 2002; Stephenson et al. 2002; Lester et al. 2003; O'Reilly et al. 2005; Hofmann et al. 2006l Maltezou et al. 2008; Pareek et al. 2009; Wicker et al. 2009a) and pandemic influenza immunisation (Miyakis et al. 2011) to protect themselves (and their families), rather than their patients. I also concurred with Ohrt and McKinney (1992) that social norms are important in vaccine acceptance and that this can have a positive or negative effect on uptake. In addition, I have found, like Abramson and Levi (2008), that senior HCWs, and like O'Reilly et al. (2005) and Qureshi et al. (2004) that OH units advocating influenza immunisation, can have a positive effect on uptake rates. It is difficult to come to any conclusions about the extent to which the OH role as advocates is important and as a result I do not discount Yassi et al. (1994) in their assertion that their role is limited. Senior ward staff, departmental vaccination champions and PHW may have more influence on colleagues, as was proposed by vaccination champions in Chapter Five; but OH agents are essential in planning and organising the programme.

Furthermore, informants reported different reasons for non-uptake of influenza vaccination depending on their profession, as did previous studies (i.e. Seale et al. 2010; Trivalle et al. 2006; Martinello et al. 2003; Cowen et al. 2006). Doctors were more likely to state that influenza vaccination was unnecessary, whereas nurses and midwives were more likely to say that time pressures, convenience of the immunisation programme and fear of side-effects were the important issues. This may reflect doctors' higher professional confidence in making such clinical judgements.

Unlike Qureshi et al. 2004, I did not consider whether there were gender differences in reasons for vaccine acceptance or refusal. This was due to the gendered nature of my sample, with a large majority of the participants being women. While reflecting the gender composition of the NHS, I felt unable to make comparisons between the genders with such a small sample of male informants, almost all of whom are doctors, rather than nurses or midwives (which could be a confounding factor in any gender differences).

Like Yassi et al. (2010), informants proposed that health professionals would like vaccination campaign materials which are produced at an appropriately scientific level for them, rather than simplistic information sources aimed at the lay public. Furthermore, informants recommended that a variety of campaign materials at different scientific levels for different groups of people working on health board premises should be inserted into the network.

In addition, I found like Yassi al. (2010) that the immunisation programmes were conducted in isolation from other IPC campaigns (certainly before the 2009-10 pandemic) and that informants proposed that vaccination should be more conveniently available, such as in the workplace (as did Pachucki et al. 1989; Doebbeling et al. 1997; Harbath et al. 1998; Ohrt and McKinney, 1992; Decker and Schaffner, 1990; Girasek, 1990; Adal et al. 1996; Fedson, 1996).

As the informants in this study were not offered pre-pandemic vaccines during the 2009-10 pandemic, I was unable to compare reasons for HCWs' acceptance and refusal of pre-pandemic vaccines with Pareek et al. (2009) and Chor et al. (2009).

The informants reported similar concerns as previous research had shown: about pandemic vaccine safety (Kaboli et al. 2010; Miyakis et al. 2011), fear of side effects (particularly GBS[138]) (Eames et al. 2010; Maltezou et al. 2010; Rachiotis et al. 2010) and HCWs not considering themselves to be at risk of contracting pandemic influenza (Maltezou et al. 2010; Virseda et al. 2010; Eames et al. 2010; Poland et al. 2010; Rachiotis et al. 2010; Steelfisher et al. 2010) and to be a serious illness risk to them (Dube et al. 2010; Kaboli et al. 2010; Rachiotis et al. 2010; Miyakis et al. 2011). Informants also put forward that pandemic influenza vaccine safety information was insufficient (Maltezou et al. 2010; Rachiotis et al. 2010; Miyakis et al. 2011) and that the most used source of information was the media (Rachiotis et al. 2010; Miyakis et al. 2011). The informants, however, did not suggest that this source of information was associated with an increased refusal of vaccination due to fear of side effects. In fact, informants stated that media stories were mainly concerning serious cases of H1N1 and that these stories encouraged them to accept pandemic vaccination. Furthermore, unlike Rachiotis et al. (2010) and Savas and Tanriverdi (2010), I did not find that medical sources of information were associated with pandemic vaccine acceptance. This was because the informants reported that they had not sought scientific evidence before making a decision on pandemic (or seasonal) influenza vaccination. This is concerning given that HCWs are supposed to be evidence based professionals, but may be unsurprising given the limited time available for HCWs to insert such evidence into their networks. On the other hand, this can also be seen as seasonal and pandemic influenza viruses' lack of success in inserting such evidence into HCWs' networks and lack of prioritisation of accessing such evidence by HCWs. I would argue that this points to HCWS still not taking influenza seriously post-pandemic. In

[138] This may be related to perceived high levels of GBS among recipients of influenza vaccine during 1976 (Pachucki and Jackson 1985; Safranek et al. 1991).

fact, informants only reported seeking medical advice from colleagues and not from official sources of information. These unofficial sources were reported to be connected with pandemic vaccination refusal.

Qureshi et al. (2004) asked: 'Would the greater use of incentive influence health care workers in a positive direction? These are issues that ought to be considered in further research programmes' (Qureshi et al. 2004:200). Informants, quoted in Chapter Seven, proposed that incentives would encourage HCWs to accept influenza immunisation. However, Cheema et al. (2013) found that a one hour time off incentive for US HCWs was unsuccessful in changing their decision to accept influenza immunisation. I recommend that future research should consider the success of inserting incentives into UK HCW influenza immunisation programmes.

What my study adds to the previous research is that I've fitted these isolated findings together into an overarching narrative and provided an architecture for this. So although I have a limited dataset, it is consistent with these other reports, for the most part, and provides empirical evidence of why it is not consistent with others. So these other reports now make sense as part of a system, rather than a set of disconnected studies of small topics. Therefore, we can consider that this validates my work on the system and contributes to my analysis of the system as a whole. What I've done here is provide a way to put these things together and an understanding of how these things go together and how a system works as a whole. As a

result, I conclude that we need a systemic approach as policy actions and not an individualistic approach that has previously been advocated by policy makers.

The next section considers further why this individualistic approach is the wrong one to take in this programme.

Active Resistance, Active Demand and Passive Acceptance in the Network

In the introduction to Chapter One, I reported that most attempts to increase HCWs' uptake have been predicated on the assumption that these low rates are the result of reluctance or resistance by individual HCWs, who must be persuaded or coerced to comply with employer directives; and that, in 2011, the CMO for England, Dame Sally Davies, asserted that 'It is very selfish [for NHS staff] not to be vaccinated [against influenza]' (Guardian 22/09/2011). However, the most important message in this thesis is that low uptake is largely the result of complex social, organizational and cultural processes. Only when these have been changed will it be appropriate to frame the remaining problem as reluctance or resistance by individual HCWs.

In fact, I found very little active resistance to being vaccinated against seasonal influenza, before or after the pandemic. However, there did seem to be more outright rejection of the pandemic vaccine. Informants reported that this was mainly due to safety concerns about a novel vaccine; and given that pre-pandemic seasonal uptake was so low, pandemic uptake

may also have been affected by this. Since the pandemic, seasonal uptake has increased. While the H1N1 virus has persuaded some HCWs to actively seek out and demand post-pandemic seasonal vaccination, I found that passive acceptance of vaccines delivered using mobile vaccination clinics remains more important. I also discovered that vaccines and information are still struggling to reach HCWs in the first place, before the issue of whether they need or want to be vaccinated ever has to be confronted. Many of the issues around whether they agree to be vaccinated or not, are not the kind of personal idiosyncrasy that the dominant accounts have. The number of outright rejecters with personal, philosophical or ideological grounds, are very small. Most HCWs do not get the opportunity to accept or reject. Many who do reject, reject for other reasons than idiosyncrasy. They have good and adequate reasons for rejecting it, which have really not been addressed by the delivery system.

These findings were only revealed due to the ANT approach that I employed. I flipped the usual story, by studying the vaccine journey, and what I discovered are that there are all these obstacles 'en route', which are not really being dealt with by policies. The reliance on targets, and sanctions (i.e. fines in England), are pointless or at least totally premature until delivery of vaccines has been optimised. The seasonal programmes have improved and uptake has increased since the pandemic, but there is still a lot of work for governmental and organisational actants to do before individual HCWs can ethically be targeted for blame and sanctions. As a result of this doctoral thesis: (a) we're better informed as a whole, and (b) we now know that some well-placed people in the network have got it completely wrong.

Below I examine further, why ANT made a difference to the study.

Advantages of Employing an Actor-Network Theory Approach in the Study

In Chapter One, I outlined that the majority of research done in this area has focused on individual motivations and the micro-level for non-uptake rather than macro- and meso-level explanations and that policy implications also need to be considered further. The lack of studies developed within a theoretical framework (Michie and Abraham 2004; Bish et al. 2010a) and undertaken from an explicitly sociological perspective was also highlighted. I would argue that this study provides a qualitative, theoretically framed analysis (i.e. using an actor-network analytic approach) of the HCW influenza immunisation programme in Wales. This ANT-informed, sociological (i.e. sociology of translation and sociology of associations, rather than the sociology of the social) approach provides a different, and in-depth, perspective on the HCW influenza immunisation programme, i.e. how and why this preventive health practice has been established, maintained and evolved.

In this study, ANT is used as the theoretical framework, methodological underpinning of the analysis and set of sensibilities for research. The methods used to generate the data (i.e. interviews, focus group discussions and documentary analysis), and the sampling and analytic strategy, are informed by the theoretical framework and methodology. An ANT-informed approach, allowed me to sample theoretically, by focussing on informants that are particularly interesting actants in the network for this study. This was practically very useful since the number of actants in a network is potentially infinite. The 2009-10 pandemic itself

was an important actant in this theoretical sampling because the ANT approach is particularly useful in novel situations, such as pandemics, where the work done by non-human and hybrid actants comes into view.

As an ANT study, HCWs were shown not to be just passive recipients of influenza vaccines. They have a complex relationship with this technology. This complexity is in part produced through associations in other networks that HCWs are enrolled, such as social, cultural, gender, ethnic, educational and professional networks. So vaccine acceptability is influenced by a HCW's personal, social and professional history and current position. Professionally, influenza immunisation is inserted into a particular organisational, departmental and professional culture. An individual's own and second-hand experience of vaccinations, individual circumstances (such as time available to access immunisation) and knowledge about immunisation are all involved in the HCW influenza immunisation programme actor-network.

In ANT, 'there is no such thing as technology transfer', only adaptation to new networks. My task was to trace how those vaccines travel from these organisations to their final destination which is inside the bodies of HCWs. Influenza viruses, in the form of vaccines, achieve this by building a network and set of passage points as it travels; this is done through the mobilisation (i.e. work) of heterogeneous mediators. ANT helped me to illuminate that inserting knowledge into HCWs may not be successful because nothing is ever just inserted into a network; it is always translated by the actants (e.g. HCWs) already in the network.

Crucially, for this ANT approach, influenza viruses and vaccines play a key role in HCWs decision-making in this occupational immunisation programme. ANT was able to deal with the complexity of inserting a technology (such as an influenza vaccine) into a network by considering influenza viruses and vaccines as full-blown actants. It was particularly important, given the interdisciplinary nature of this doctoral study, (i.e. sociology and epidemiology), that influenza viruses and vaccines, as well as human actants, were pivotal in the analysis. This feeling was reinforced by the data that was generated during the fieldwork stage of the research, and also by the documentary materials that were analysed.

ANT offered another approach to understanding influenza viruses and vaccines, where these entities are not only acted upon but also push back against other actants in the net. The western biomedical, allopathic and epidemiological perspective on influenza was both deepened and challenged with an ANT examination of influenza actants. For example, ANT revealed that Influenza is not only a protean clinical entity but it is also a multiple, fluid social entity. So in this study, influenza viruses and vaccines are fluid, unstable objects in the actor-networks in which they are enrolled; they have different meanings for different HCWs and organisations (for example, countries, governments, healthcare organisations). In addition to the heterogeneity of HCWs, the nature of influenza itself also means that different strategies need to be inserted into the net, i.e. influenza is not an immutable mobile for HCWs; it means different things to different people, dependent upon their place in the network. In this way influenza vaccines are complex, hybrid associations of socio-legal, human, natural and technical elements in fluid actor-networks, packaged as medical devices. Pharmaceuticals, such as influenza vaccines, can be unblackboxed by ANT in numerous ways.

By applying an ANT approach it was revealed that an influenza vaccine is a bio-technological actant, in a network, which has embedded in its scripts normative values and discourses of individual and professional responsibility for HCWs. For example, prioritising HCWs for influenza vaccination is in itself an ethical act around resource allocation and supports the idea that HCWs are susceptible to and/or spread influenza infection, and that they have a moral duty to accept influenza immunisation so that they do not act as a vector of influenza to their patients or are unable to fulfil their work role due to illness caused by influenza infection. Using ANT, I exposed the importance of HCWs' ethical values as actants in the UK HCW influenza immunisation programme, in addition to other actants which were identified.

By following an influenza vaccine and tracing its associations with other actants enrolled in its network I could understand the different perspectives of these heterogeneous actants. In this study, for example, the non-human and hybrid actants would include (amongst others) influenza viruses, influenza vaccines, policy guidance documents and promotional tools like posters or emails to HCWs; all these non-human actants have agency and the potential to shape the agency of human actants. This study considered the extent to which, and through the work of which actants, the HCW influenza immunisation programme has achieved temporary stability. For example, OH Professionals are obligatory passage points in this network and this position is achieved through displacement, by organizing and administering the immunisation programme, in order to temporarily stabilise the network.

The potential of an ANT approach for a PH study such as this and the subsequent policy recommendations to stabilise the network should not be underestimated. This is an

important contribution to knowledge because as Yassi et al. (2010) highlight, 'Few have proposed clear policy implications [of the immunisation programme] for the health care system' (Yassi et al. 2010: S41). This novel theoretical approach is also likely to be transferable to other healthcare programmes. Current policies and sanctions are predicated on individuals and individual healthcare provider organisations, but in the light of this study we should be doing something completely different. My policy implications, given below, are based on my critique of these individualist explanations and on this very novel (ANT) analysis.

Policy Implications

1. Given the importance of media and official messages that informants reported as mobilising them as vaccinees, particularly media reports during the 2009-10 pandemic, I recommend that UK governments and the mass media work together more in order to insert more immutable mobiles into the net, in the form of messages about influenza (and other respiratory) viruses and vaccines.

   Action: For example, on WG, PHW, LHB and websites, in payslip advice notes, in print and electronic, including social media. In particular, misinformation, for example about side-effects of vaccination should be countered. PH tenets should be embodied in the advice and PHW should be visible in the immunisation programmes.

2. Informants reported that text messages are already used successfully with patients in the two LHBs to remind them to attend appointments. This may be more accessible for some HCW groups who do not have the time or the access to email facilities.

Action: LHBs should insert digital technologies into the network, i.e. with text messages to inform HCWs of vaccination clinic times and locations.

3. One way that official messages can be inserted is in the form of compulsory annual training modules, which to date influenza has failed to insert itself into.

Action: Training and re-validation of professional status could be re-assembled and blackboxed together by LHBs and professional bodies, respectively. Non-medical staff in particular need more access to CPD about influenza and vaccination. Information should be tailored to different audiences. In addition, official messages in the form of UK legislation and the 'Green Book', while already in the net, have failed to mobilise HCWs as vaccinees. Official statements, from for example the RCN, RCM and NMC, emphasising this legislation may have a future role to play. For example: 'the Nursing and Midwifery Council also issued guidance for healthcare staff during the pandemic. This guidance reminded healthcare professionals that they are accountable for their actions' (Hine 2010: 106). Professional accountability for spreading influenza infection, packaged as the duty not to harm, and professional accountability to recommend and administer influenza immunisation (where appropriate) to the identified risk groups should be reiterated to HCWs by their professional bodies.

4. Furthermore, official messages from supra-national organisations, such as WHO and ECDC, have the potential to mobilise sovereign states and, by extension, HCWs in the influenza immunisation programme network.

Action: While official messages from such supra-national organisations have already been inserted into the net I propose that re-assembling these messages to emphasise the protection of vaccination for people (i.e. patients, HCWs and the public) rather than just for health infrastructure may achieve more work in the net. The UK Government also needs to consider the legal position of the immunisation programme and if it is 'in potentia' already mandatory with existing legislation that has already been inserted into the net.

5. Given that informants stated they did not view influenza as a HAI or HCAI, one official message that needs to be inserted is that influenza is a HAI/HCAI.

Action: This insertion needs to be implemented by heterogeneous actants, including healthcare organisations, senior members of health professional groups, i.e. doctors, nurses and midwives, IPC Teams, IPC Champions, OH departments and vaccination champions. In particular, IPC teams need to be mobilised to take joint responsibility, in conjunction with OH, for the immunisation programme.

Influenza was also revealed to have failed to insert itself into the IPC champion role; these actants need to be enrolled into the network to mobilise more colleagues as vaccinees. There is also the potential to enrol IPC champions as vaccination champions or to enrol more vaccination champions as a separate role. In either case more vaccinators are needed, whether they are OH staff, agency staff, vaccination champions or IPC champions, if more vaccines are to be inserted into HCWs. There is also scope for nurses and midwives to vaccinate colleagues in some departments.

PHW also has a role, i.e. as vaccination champions, in the network, but this mobilisation needs to be stabilised.

6. If healthcare organisations really want to protect their patients, staff and the public then all people working on LHB premises should be offered influenza immunisation.

Action: More vaccines need to be inserted into the net, as WG and PHW are still not ordering enough vaccines to vaccinate 100% of staff. If the devolved or UK government provided LHBs/Trusts with enough vaccines and vaccinators to vaccinate everyone working on their premises, then a target may be more successfully met if there were sanctions placed for unused vaccines. A national tender for vaccines could reduce the cost of vaccines through economies of scale. LHBs/Trusts need to offer fair access in terms of vaccines and times and locations of immunisation clinics, i.e. for peripatetic, shift, rural and part-time workers.

7. The protection for HCWs and their families also needs to be emphasised, since informants reported that this is the primary reason why they accept influenza immunisation. The fact that influenza can be transmitted asymptomatically or pre-symptomatically also needs to be inserted into official messages.

Action: These messages need to be inserted by LHBs/Trusts, healthcare professional bodies, devolved and UK governments.

8. Given the importance of ethical values as actants in the network, HCWs' bioethical duties and values, i.e. duty of care, not to harm, not to spread infection and to treat should be emphasised by healthcare organisations, professional groups and senior health professionals.

Action: This needs to be done during training, in official statements and as part of everyday working discourse.

9. Healthcare organisational change and size of healthcare organisation were revealed to be factors during and post-pandemic.

Action: UK governments and healthcare organisations should consider these organisational factors in their seasonal and pandemic influenza planning, i.e. communication difficulties in larger organisations, access to vaccines in smaller/rural hospitals and organisational culture.

10. Given the proposed power of social norms and status competition in 'nudging' organisational behaviour, visibility of compliance rates in different professionals/departments/hospitals/LHBs may mobilise HCWs.

Action: Immutable mobiles in the form of updated charts showing HCW uptake rates should be considered.

11. Other informants reported needle phobia, while intra-nasal vaccines are more expensive than injectable ones, this method of administration is being employed in the forthcoming childhood influenza immunisation programme, and this begs the a question why can it not be employed with HCWs as well?

Action: Intranasal vaccination should be considered for those HCWs in which it is effective (i.e. those under 50 years of age), particularly for HCWs with severe needle phobia.

12. The UK devolved governments need to consider whether they want to consider inserting a metaphorical carrot or a stick into the net. Given the evidence for the cost effectiveness of the immunisation programme, financial incentives for vaccinees would surely pay for themselves, as would the extra expense to pay for agency staff to vaccinate; or Wales could follow the example of NHS England and impose financial sanctions for not meeting the target. The success of such a scheme has not been proved, with NHS England only achieving an average uptake of around 50% in the 2013-14 season, while a target of 75% had been introduced.

Action: WG could consider inserting incentives or sanctions to improve uptake.

13. Given the instability of the programme a stable start date for the programme may help to secure the programme in the HCWs' knowledge assemblage. In addition, a concerted campaign during the month of October would mean that staff are

vaccinated as soon as possible to obstruct the transmission of influenza to as many people as possible. Although there will need to be some flexibility as influenza viruses do not always conform to expectations in vaccine production, which can lead to delays in the availability of vaccines.

Action: Stabilise October as the month when the campaign is delivered, with a concerted push to vaccinate from OH and non-OH vaccinators. Following the successful example of 'Movember', which mobilises men to grow a moustache every November in order to raise awareness of men's health issues, a campaign, e.g. 'Flu-jab-tober', could be introduced.

14. Given the trust that vaccination champions have from colleagues they may be a more efficient source of information than other sources.

Action: Ensure that vaccination champions are fully utilised in inserting knowledge of the programme into colleagues.

15. OH doctors vaccinating may increase vaccine uptake, particularly during pandemics.

Action: Consider mobilising OH doctors as vaccinators, particularly during pandemics.

16. Reporting systems were revealed to be important actants and the yellow card system was identified as not being mobilised sufficiently in the network.

Action: LHBs should utilise yellow card system to full potential.

17. Informants reported that OH services are under resourced in Wales compared to England and that the HCW influenza immunisation programme as significant contributing factor to this problem.

Action: WG should examine the resourcing of OH services in NHS Wales and Local Authorities.

18. Another 'nudge' that could be implemented is declaring influenza immunisation status when staff are joining a new healthcare organisation and staff could also be asked about their immunisation status in their annual appraisals and revalidations.

Action: Influenza immunisation status should be attached to OH and HR records.

Suggestions for Future Research

In addition to policy implications, I also suggest that in future work, it may be of benefit to approach this subject on a more longitudinal basis and/or to investigate what effect my policy implications have had for any healthcare organisations that have chosen to adopt them, or to conduct a multi-intervention study (e.g. increasing numbers of vaccination champions (HCWs, and hybrid actants such as posters, intranet announcements and the media as advocates) and vaccinators (including through the use of nurses and midwives to vaccinate colleagues), inserting influenza immunisation into the IPC champion role and inserting more mobile vaccination clinics (administered by OH and non-OH HCWs)), informed by the policy implications. It would also be useful to replicate this doctoral work in an English setting or to

compare Wales and England five years on to assess whether the more laid back approach of the WG or the more aggressive approach of the UK government has been the most effective in increasing uptake[139]. I also suggest that further research investigating the different targeting strategies of the English and Welsh NHS organisations is required. Given the unofficial mandates that I found present in ICUs, this would also be an interesting setting to study further.

Furthermore, this study suggests that further research is needed into HCWs' beliefs about medicine and science in general. I would also argue that this study has wider implications for: other HCW health and illness issues (including the organisation of occupational health services in hospitals); and, other hospital IPC issues.

Final Words?

> Thus, for ANT, there is no final word, no line to draw under an analysis to bring it to a close, no necessary completion of accounts. Thus there is no necessary end to the elements that may contribute to a network, no general criterion by which ANT may bring an end to the list of what belongs and what is responsible. This feature of ANT has been noted by Strathern (1996) (Lee and Stenner in Law and Hassard 1999: 93).

So even though this is nearly the end of this thesis, the HCW influenza immunisation programme network that I have studied will continue to exist, at least as long as the actants do sufficient work in this network. However, the unstable nature of this actor-network was

[139] Taking into account that England had a higher starting point than Wales, both pre- and post-pandemic.

has been revealed and pandemic planning may not be able to achieve 'stabilisation in advance' (Dingwall, Hoffman and Staniland 2012) (i.e. through the creation of an immunisation programme actor-network that is primed for rapid mobilisation by a novel hybrid actant, an influenza virus with pandemic potential).

I conclude that there is still ambivalence[140] about this immunisation programme in all parts of the network that I have examined; despite the work done by the H1N1 pandemic influenza virus in the pandemic and post-pandemic network. Unlike Singleton and Michael (1993), I put forward that rather than sustaining this health programme, this ambivalence subverts and threatens the continuing success of this immunisation programme network, in that levels of uptake will still be characterised by actants within the network (i.e. WHO, UK and devolved governments, health professions and associated organisations, NHS organisations, departments, wards, teams and individuals) as low or sub-optimal.

So what is the future of this network?

The HCW influenza immunisation programme may be even more important in the future if the following trend continues:

> Many more seriously ill patients who are more susceptible to infection (because of immunosuppression or general age or frailty);...Mixing of patient populations as hospitals take in from wider catchment areas and pressure on beds leads to higher levels of in-hospital patient movements...Weaker standards of cleanliness and

[140] I am using ambivalence here both in the everyday understanding of the term as coined by Bleuler (1911) and in the sociological understanding of ambivalence as theorised by Merton (1976).

> hygiene…A lack of awareness of, and senior management attention given to, hospital acquired infection (Donaldson 2002: 62).

Other viral actants may also do work to enrol HCWs as influenza vaccinees. The recent Ebola outbreak, for example, may highlight HCAIs as a whole.

Biomedical actants are also currently trying to produce a universal influenza vaccine. If such a novel biotechnological actant was inserted into the network this would completely disrupt the relational ontology of the network. Firstly, this insertion would obviate the necessity for annual seasonal immunisation and for a separate pandemic vaccine if a virus with pandemic potential was ever inserted into the network again. Vaccinators would then be free to concentrate on trying to enrol vaccine refusers and new staff entering the organisation. However, universal vaccine acceptance may be low at first, and may be for a significant period of time, given the reticence of some people to accept novel vaccines which have no track record of side-effects, particularly long-term side-effects. The insertion of such a novel vaccine would also open up a new research space to consider such an immunisation programme.

The pandemic influenza virus enrolled me into this network (through the work of my doctoral supervisors as mediators and enrollers) and my work will continue in this network (even though I may not be involved in future research projects on this issue), as long as the actants that I have mobilised in the network continue to do work on other actants in the network. For example, the data generation interactions that I undertook may continue to do work to

mobilise HCWs as vaccinees, as some informants proposed. The artefacts from this study, i.e. the texts (including this thesis) and other outputs produced (for example, conference presentations), may also continue to do work in the network to mobilise, re-mobilise or de-mobilise) HCWs as vaccinees and to effect the delivery of the immunisation programme, as long as actants continue to read or remember them. This may, of course, also depend on the work done by influenza viruses and/or vaccines.

Chapter Nine

Critical Evaluation of the Study

Overview

In this final chapter I provide a critical evaluation of the study, including whether I have produced a good ANT account and what this means. First, I consider how I have ensured rigour in the study, before addressing the philosophical and theoretical limitations (e.g. how well ontological and epistemological assumptions of ANT help inform the study design and explain the data), the methodological and practical limitations of the study (e.g. sample size and nature), and the limitations in the analysis.

Rigour of the Study

I have undertaken the following strategies to ensure the rigour of this study:

(i) Prolonged engagement - The difficulties in generating the interview and focus group data at least meant that I had prolonged engagement, over two winter influenza seasons, in the two LHBs;

(ii) Reflexivity - A reflexive account is given in Chapter Three;

(iii) Thick descriptions - The descriptions furnished in Chapters Four to Eight are, nothing if not, thick;

(iv) Audit trail - I have an audit trail available of the data chapters (i.e. where the data extracts were indexed), and the iterative process of data generation, analysis and writing up are given in the various drafts of the chapters and two different versions of the thesis;

(v) Peer debriefing - the audit trail and peer debriefing is also evidenced in the written records of the supervision sessions with my doctoral supervisors and email communications between us. In addition, I have presented my doctoral findings at national and international conferences.

It is my interpretation of the data extracts that I am presenting in this thesis, rather than any unmediated access to the actants' accounts, despite ANT's claims to the contrary. For the data that I generated, I take a critical and interpretative stance, and as such respondent validation/member checking is not necessarily helpful.

Since the methods used in this study are qualitative, reliability and validity are not relevant issues. Instead, credibility, transferability, dependability and confirmability are the concerns in this thesis (Bryman, 2001). Credibility is presented by having more than one example of each claim made, where possible. Transferability is given in the quotes from interviews and focus groups, and in the documents, that have been examined. Dependability is provided by looking for similar themes in utterances around other vaccines and other diseases. Confirmability is possible by reading the quotes and documents that were analysed in this study.

Limitations in the Analysis

The fact that there is a paucity of qualitative, sociological research into influenza immunisation programmes means that there is a lack of work against which to check the

findings of this thesis. Furthermore, as this doctoral project was carried out by only one researcher this means that it could be criticised for not having the benefit of inter-rater reliability. However, wherever possible transcript extracts are provided which enables readers to assess the reliability of the analyses provided by me. Furthermore, my two doctoral supervisors, who are a clinician and a sociologist, have assessed the reliability of these analyses.

Methodological and Practical Limitations of the Study

Within the practical and resource limitations of a doctoral study, it was only possible to investigate a small target population size and limited time period of the immunisation programme analysed. While giving some comparisons with the English programme, this study has primarily focussed on the Welsh immunisation programme. The data generation took place after the 2009-10 H1N1 influenza pandemic and therefore the pandemic immunisation programme was not amenable to observation. Therefore, it was necessary to create these interview and focus group situations to examine the pre-pandemic and pandemic programmes. It was a practical decision not to conduct observations during the 2011-12 and 2012-13 winter influenza seasons. This decision was reinforced by not being able to compare observations with those from the pandemic and pre-pandemic immunisation programmes. Although I did 'hang out' in the research sites (Dingwall 1997). In addition, I was a participant observer, at a LHB not considered in this study and after the data generation stage of this study had ended (i.e. Autumn 2013), as a member of university research staff based at a hospital. My honorary research contract at the LHB was my passport to being able to receive the vaccination. This immunisation encounter was illuminating, e.g. the way in which the

mobile clinic (i.e. vaccinators and vaccinees) was quickly assembled through word of mouth in the department and unassembled. This episode also made me realise that it would have been of value to use observation in my study.

However, 'There is no reason to believe that HCWs in other hospitals are intrinsically different' (Wicker et al. 2009a: 201). The processes involved are not fundamentally different in any health care system, although some of the structural details may vary in ways that facilitate or obstruct the vaccine journey. Furthermore, analytic generalizability, that is, 'how far we can draw conclusions from interviews [or focus groups] to other people or other situations' (Flick 2007: 81) and external generalization which 'depends on how the variety of groups was constructed: the greater diversity of the groups and in the groups' (Flick 2007: 86) are the goals of this research.

These practical limitations of the study are also a theoretical limitation of adopting ANT approach. This is considered in the following section.

Philosophical and Theoretical Limitations of the Study

This study has identified several areas of under-theorisation in ANT. In particular, I have endeavoured to counter the deficit in ANT of ethical values and social norms, language and knowledge as actants. ANT scholars have struggled with the problem of knowledge and have to some extent disregarded it as an object/subject of study. Furthermore, I have revealed that immutable mobiles, i.e. the factsheet, do not have travel far at all within a network in

order to work. So while ANT has been in existence for around thirty years, I would argue that there are still research gaps that need to be occupied if ANT is to be considered a fully theorised approach. Whether ANT could ever fully describe the role of such non-human and hybrid actants is another issue, which ANT theorists have also failed to address thus far.

Another area of theoretical limitation in ANT is its lack of distinction between different types of action. I want to assert the value in distinguishing between causality and intentionality in action. However, this does not mean that I ascribe *a priori* intentionality to human actants and only causality to non-human actants. In addition, I would highlight that I do not agree with the ANT tenet that agency is embedded in actants. Instead, I believe that agency, or rather *agencement*, is relational and distributed between actants.

Of practical necessity, all ANT studies are partial because networks are almost (or indeed are) infinite. Conceptually, it was useful to remember that the UK HCW influenza immunisation programme extended actor-network consists of multiple smaller networks (for example, the four devolved nations, healthcare organisations, institutions, departments and professions) (Cresswell et al. 2010). This ANT approach then allowed me to 'examine how these different networks align or fail to align (e.g. across different wards) and how they are positioned in relation to each other and larger networks (e.g. the hospital, the historical, cultural, political environment) [Singleton and Michael 1993]' (Cresswell et al. 2010: 74).

This study has considered the NHS Wales influenza immunisation programme network over a limited period of time and in defined locales (i.e. three departments in two hospitals in different LHBs). The title of this thesis suggests that this synthesis is limited to the period 2009 to 2011, but I have also considered the period before the 2009 pandemic, particularly from 1999 onwards when the immunisation programme was first officially inserted into the UK network, and more recent developments. In addition, the actions, actants and networks that eventually resulted in the establishment of the immunisation programme have been examined to some extent. For example, the evolution of science and other immunisation programmes have also been shown to be mediators in this immunisation programme. Furthermore, I would argue that I have produced transferable insights into the wider UK influenza immunisation programme. Indeed, this study has highlighted how it is difficult to separate the Welsh immunisation programme from that in England given the complex structure of the UK healthcare system, particularly during the 2009-10 H1N1 pandemic where four devolved national programmes and one UK national programme were inserted and mobilised at the same time. However, some aspects of the pandemic response were different in the four programmes and this was important given the heterogeneous nature of the experience of the pandemic in the nations: 'Epidemics have a unity of place as well as time - and even worldwide epidemics are experienced and responded to at the local level as a series of discrete incidents' (Rosenberg 1989: 15).

The value of an ANT approach has been questioned due to its descriptive, rather than explanatory and theory producing, analysis. The question relating to the space left in ANT for critical analysis has been answered by the fact that an ANT account which gives voice to all

actants in the network equally will always highlight areas for critique. As an ANT study, I followed the actants and let them speak for themselves where possible. However, not all actants, i.e. non-human and hybrid, could speak for themselves. For example, influenza viruses and vaccines are visible in the laboratory through the use of electron microscopes but their action in the world outside the laboratory is only visible through the effects that they have on other actants, i.e. human, non-human and hybrid hosts. Thus the data generated, by the research methods employed in this study, are given by human (informants) and hybrid (documentary) actants.

Having considered the theoretical limitations of this study, I will now consider if this thesis is 'a good ANT account'.

A Good ANT Account?

Latour (2005: 129) has defined a good ANT account as: 'one that traces a network. I mean by this word a string of actions where each participant is treated as a full-blown mediator', and:

> If I had to provide a checklist for what is a good ANT account— this will be an important indicator of quality— are the concepts of the actors allowed to be stronger than that of the analysts, or is it the analyst who is doing all the talking?... As far as writing reports is concerned, it means a precise but difficult trial: Is the text that comments on the various quotes and documents more, less, or as interesting as the actors' own expressions and behaviors? (Latour 2005: 30).

In Chapter Two, I outlined that tracing actor-networks involves investigating and/or theorising about how those actor-networks came into being, how actants are enrolled into and mobilised in a network, tracing the associations between actants that are present within the network, how networks intersect with other networks and become part of extended actor-networks, and how networks achieve durability, or at least temporary stability, or why they do not, and how networks change (are re-ordered and re-configured) over time. I believe that I have traced the parts of the HCW influenza immunisation programme network that are theoretically and sociologically of interest to me, at least to the extent allowed by time and other practical constraints. Furthermore, I propose that the actants that I have described have been mediators rather than intermediaries in the network. In addition, I have endeavoured to allow the concepts of the informants to be stronger than my interpretations of their utterances. This is evidenced by the inclusion of transcript extracts to support my arguments wherever possible. Finally, I have attempted to furnish comments which are as interesting as the quotes from the informants.

One test of the quality of a study is the extent to which it has met the objectives set for the study[141]. I would argue that the objectives have been successfully met. Evidence for this claim is provided earlier in the thesis, i.e. in the four empirical chapters and in Chapter Eight. Another indicator of a good study is if it compares its results with previous research, which Chapter Eight does. In addition, I would argue that I have additionally provided a thick description of this HCW influenza immunisation programme actor-network, including the

epidemiological, legal, political and bioethical basis for this immunisation programme and that I have traced the journey of how influenza viruses in the form of vaccines have travelled from pharmaceutical companies to LHB organisations and from there into healthcare professions, hospital departments, wards, teams and individual HCWs.

Contribution to Knowledge

In addition to the above, I want to highlight that I have contributed to knowledge about HCW influenza immunisation with the use of novel approach to address this issue, i.e. ANT. Furthermore, I have re-assembled ANT, as all ANT studies should do, particularly with my insights into the role of viruses, vaccines, social norms, ethical values and knowledge. I have also signposted the underexplored issue of language in networks, i.e. Welsh and bi-lingualism.

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List of Appendices

Participant Information Sheet
(Final Version 1.1: 29/09/2011)

Title of Study: A sociological investigation of the reasons why health professionals accepted or declined the offer of vaccination against H1N1 pandemic influenza during the 2009/10 winter season.

Name of Researchers: Ms Rachel Hale and Professor Jonathan Nguyen-Van-Tam

We would like to invite you to take part in my research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. We will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Ask us if there is anything that is not clear.

What is the purpose of the study?

This study is being carried out as part of a PhD project. The purpose of the study is to understand why health professionals accepted or declined the offer of vaccination against H1N1 pandemic influenza during the 2009/10 winter season. Other studies carried out in this area have not used individual interviews or sociological analysis methods.

Why have I been invited?

You are being invited to take part in this study because of your acceptance/rejection of the H1N1 pandemic influenza vaccine during the 2009/10 winter season, your qualified health professional status, length of service and department that you are based in. We are inviting approximately one hundred and twenty health professionals to take part in the study altogether. About sixty of these are from your hospital and the other sixty are from another hospital in Wales. Half of the participants will take part in individual interviews and half will take part in focus group discussions. Approximately six participants will take part in five focus groups at each hospital. Focus groups will consist of all doctors, all nurses or all midwives. There will be no mixed profession focus groups.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. This would not affect your legal rights. If you do withdraw from the study, this will have no effect on your relationship with any organisation or agency.

What will happen to me if I take part?

The study involves one individual interview or focus group discussion (and short questionnaire) that lasts two hours or less, which will be digitally audio recorded. The audio recording will then be turned into a written transcript which will be analyzed using social science methods. The purpose of the questionnaire is to help with the identification of participants in the focus groups and to provide additional information from participants that they may not want to share with the other participants (such as vaccine acceptance or non-acceptance). Audio recordings will be deleted from the audio recorder as soon as they have been saved on a password protected University of Nottingham laptop to which only Rachel Hale and the Data Custodian at the University of Nottingham have access. Excerpts of audio-recordings may also be heard by university examiners but participants' names will not be revealed to these examiners. The transcripts will be kept on a password protected University of Nottingham laptop to which only Rachel Hale and the Data Custodian at the University of Nottingham have access.
Preferably, key informant interviews with the Director of Occupational Health, Director of Medicine, Director of Nursing and Director of Midwifery will take place before the focus group discussions in order to use the findings from the key informant interviews as focussing materials for the focus groups. Preferably, the key informant interviews and focus group discussions will take place before the non key informant interviews in order to use the findings from the key informant interviews and focus group discussions as discussion materials in these interviews. The interviews and focus groups will take place during work time at the hospital where you work in a private room.

Expenses and payments

Participants will not be paid to participate in the study.

What are the possible disadvantages and risks of taking part?

Because of this study, there could be violations of your privacy. To prevent violations of yours or others' privacy, please do not talk about any of your own or others' private experiences that you would consider too personal or revealing.
Focus group participants have an obligation to respect the privacy of other members of the group by not disclosing any personal information that they share during our discussion.
All the information you give will be kept confidential to the extent permitted by the law, and names of all the people in the study will be kept confidential.

What are the possible benefits of taking part?

We cannot promise the study will help you but the information I get from this study may help others in the future, for example, by making influenza vaccination and information about the vaccination more accessible.

What if there is a problem?

If you have a concern about any aspect of this study, you should speak to the Chief Investigator (Professor Jonathan Nguyen-Van-Tam) on the contact details given at the end of this sheet and we will do our best to answer your questions. If you remain unhappy and wish to complain formally, you can do this by contacting NHS Complaints. Details can be obtained from your hospital.

Will my taking part in the study be kept confidential?

The procedures for handling, processing, storage and destruction of their data meet the requirements of the Data Protection Act 1998. The anonymised transcripts from the interviews and the focus groups are to be retained by the Economic and Social Research Council for use in future studies. Only the researcher (Rachel Hale) and the Chief Investigator (who is also the Data Custodian) will have access to view identifiable data. No directly attributable quotes identifying any participants will be used in the study.

We will follow ethical and legal practice and all information about you will be handled in confidence.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and on a password protected database. Any information about you which leaves the hospital will have your name and address removed (anonymised) and a unique code will be used so that you cannot be recognised from it.

Your personal data (address, telephone number, email address) will be kept for less than three months. As soon as the fieldwork has been completed at your hospital, your personal data will be deleted from our records. All other data (research data) will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken by all those involved to maintain your confidentiality, only members of the research team will have access to your personal data.

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time, without giving any reason, and without your legal rights being affected. If you withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis.

What will happen to the results of the research study?

The research findings will be reported in a PhD thesis, academic journals, at academic conferences and at a presentation to the World Health Organization. A summary sheet of the

findings of this research can be supplied to you by your Occupational Health Department when the analysis has been completed if you wish. The results are likely to be published by 2014. You will not be identified in any report/publication.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is being jointly funded by the Economic and Social Research Council (ESRC) and the Medical Research Council (MRC).

Who has reviewed the study?

All research in the NHS is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by North Wales Research Ethics (Central and East) Proportionate Review Sub-Committee.

What do I do next if I wish to take part in the study?

Please contact the researcher (Rachel Hale) by email to mcxrh3@nottingham.ac.uk or by phone on within two weeks of receipt of this information sheet.

Further information and contact details

Chief Investigator:
Professor Jonathan Nguyen-Van-Tam
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Tel: 0115 82 30276
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(Form to be printed on local headed paper)

CONSENT FORM

(Final Version 1.0: 06/09/2011)

Title of Study: A sociological investigation of the reasons why health professionals accepted or declined the offer of vaccination against H1N1 pandemic influenza during the 2009/10 winter season.

REC ref: 11/WA/0278

Name of Researcher: Rachel Hale

Name of Participant: **Please initial box**

1. I confirm that I have read and understand the information sheet version number 1.0 dated 29/09/11 for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without my medical care or legal rights being affected. I understand that should I withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis. ☐

3. I understand that relevant sections of data collected in the study may be looked at by authorised individuals from the University of Nottingham, the research group and regulatory authorities where it is relevant to my taking part in this study. I give permission for these individuals to have access to these records and to collect, store, analyse and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential. ☐

4. I understand that the interview/focus group* will be recorded and that anonymous direct quotes from the interview/focus group* (*delete as appropriate) may be used in the study reports. ☐

5. I agree that anonymous direct quotes from the interview/focus group* transcript (*delete as appropriate) may be used in future studies (optional). ☐

6. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	**Date**	**Signature**
_____	_____	_____
Name of Person receiving consent	Date	Signature

3 copies: 1 for participant, 1 for the project notes and 1 for the occupational health notes

FOCUS GROUP QUESTIONNAIRE

Please answer the questions in block capitals before the focus group discussion begins if possible and return to the focus group facilitator when completed.

Title:

Name:

Age:

Gender:

Department:

Hospital:

Post:

Grade:

Did you receive the pandemic vaccine during the 2009/10 pandemic?

Yes/No (delete as appropriate)

Date of focus group:

Name

Address

Dear ...

I would like to invite you to participate in an interview or focus group as part of a research project being undertaken by the University of Nottingham. The research project is looking at health professionals' acceptance or non-acceptance of the pandemic H1N1 influenza vaccination during the 2009/10 influenza pandemic and about influenza vaccines in general. The interview/focus group will last approximately one hour and will be conducted by a PhD student from the University of Nottingham, who lives in Caerphilly. Participants' responses will be audio recorded, transcribed and anonymised. Focus groups will consist of up to 6 health professionals from your professional group working at the Princess of Wales hospital. Please find attached the Participant Information Sheet for more details of the project; this contains important background information. It is important to stress again that the interviews and focus groups are confidential and anonymous; nothing that is said will be ascribed to an individual and what you say personally will not be reported back to the Health Board (only general findings from the project). We recognise that staff will have mixed views about influenza vaccination for healthcare workers and we definitely want to hear from staff who have and who have not received vaccine. There are simply no right or wrong answers.

Please do not hesitate to contact the PhD student, Rachel Hale, should you wish to discuss the project further on mcxrh3@nottingham.ac.uk or 07563762878.

Please would you complete and return the reply slip below through the internal post at the Princess of Wales hospital in the envelope provided within 14 days of receipt of this letter. We will then do our best to contact you and arrange interviews or focus groups.

Yours sincerely

Name: Date of Birth:

Home address:

Ward of Clinical area:

I do/not wish to participate in the study (please delete as appropriate)

I would prefer to participate in an individual interview (tick box) ☐

I would prefer to participate in a *focus group (tick box) ☐

I am happy to participate in either format (tick box) ☐

(* the focus group will contain up to 6 individuals from the same professional area)

My phone number/email address is:

My bleep or pager number is:

Please suggest the best times or dates when the researcher can contact you to discuss setting up an interview/focus group time with you: e.g. Mondays before clinic 1-2pm

Doctors and nurses/midwives who worked in this department during the 2009/10 influenza pandemic are needed to take part in individual interviews or focus groups about their uptake of the H1N1 pandemic influenza vaccine and about influenza vaccines in general. Please see the Participant Information Sheet for more details.

If you are interested in taking part either contact the researcher, Rachel Hale, directly on mcxrh3@nottingham.ac.uk or 07563762878, or complete and return the reply slip through the internal post at the Princess of Wales hospital in the envelope provided. We will then do our best to contact you and arrange interviews or focus groups.

Thank you for your interest.

Individual Interview/Focus Group Discussion Guide

Experience of H1N1 influenza pandemic during 2009/10

Experience of H1N1 pandemic influenza pandemic vaccination program in 2009/10

Experience of seasonal influenza vaccination programs

Positive and negatives of seasonal and pandemic influenza vaccination programs

Safety of pandemic/seasonal influenza vaccine

Influenza as a hospital acquired infection

Extent/fear of pandemic in LHB/PoW

Risk of contagion with pandemic/seasonal influenza

Risk of transmitting pandemic/seasonal influenza

Risk of side effects

Vaccines' effectiveness

Choice of vaccine type

Number of doses required

Effectiveness of vaccines

Duration of protection

NHS cost of vaccines

Perceived risk of infection for the healthcare professional if unvaccinated

Risk of serious infection/ adverse outcome if not vaccinated

General attitude to injections and vaccination – hepatitis vaccine

Attitude to infection control – do they see influenza vaccination as part of this

Awareness of regulation regarding influenza vaccination & HCWs

Social marketing of the vaccines

Operational Health (OH) department involvement

Convenience of immunisation programme

Individual targeting of information

Safety culture in workplace

Influence of co-workers on decision to accept vaccines

Sickness absence policy

Quality of vaccination information

Social Networks

Duty of care

Rationing of seasonal/pandemic influenza vaccination.

What do you think is the most important issue/s that we have discussed today?

Is there anything that you thought you would be asked but weren't?

Are there any improvements that could be made to the interview/focus group questions?

OH questions

Was there enough pandemic influenza vaccine available for every HCW?

How do you decide how much seasonal influenza vaccine to allocate to HCWs?

Does demand for seasonal influenza vaccine usually outstrip supply?

How much of your job is concerned with HCW influenza vaccination (seasonal and pandemic)?

Your LHB had a higher/lower than Wales average HCW pandemic influenza vaccine uptake in 2009/10 and a lower/higher than average seasonal influenza vaccine uptake in 2009/10 and 2010/11, how do you account for this?

Has the seasonal vaccine program changed since you became a LHB and since the pandemic?

Is…hospital representative of seasonal and pandemic influenza vaccine uptake in the LHB?

What reasons are you given for vaccine non/acceptance?

Are particular professions/departments/genders/ethnicities/grades/ages/agency more/less likely to accept seasonal/pandemic influenza vaccine than others?

What about agency staff and students? Whose responsibility is it to offer them influenza vaccination?

Do you record adverse events from influenza vaccination?

Patient/HCW confidentiality